, XXI NO. 6 JUNE, 1950

THE TOOL ENGINEER

REG. U.S. TRADE MARK

CIAL PUBLICATION: AMERICAN ASTE SOCIETY OF TOOL ENGINEERS

n the Value of a Magazine . . . . . By H. L. Tigges 1

esearch—Its Application and Management in Manufacturing. . . . . By Louis J. Horn 17

ix Successful Precision Boring Techniques For Connecting Rods . . . . . By A. Francis Townsend 20

utomation in the Press Room . . . . . By Herman Zorn 23

he Technique of Micro-Drilling . . . . . By J. A. Cupler 27

esigning for Efficiency: Drilling Small Parts . . By Arthur F. Hird 31

lot Spot Machining . . . . . By Sam Tour 32

tatistics Can Change a Job Classification . By William A. MacCrehan, Jr. 35

se Time Element Data for Effective Tool Design . . . . . By N. M. Perris and H. K. Keever 40

ool Engineering Data 43

ndustry Throngs A. S. T. E. Show; Takes Home Tools to Fight Inflation . . . . . By Doris B. Pratt 48

Departments

Andygrams, 94 ● ASTE News, 48 ● Gadgets, 45 ● Good Reading, 92 ● North, East, West, South in Industry, 47 ● Tools of Today, 69 Trade Literature, 73 ● Technical Shorts, 88 Index to Advertisers, 136

Behind every manufactured product is the tool engineer

3 NEW AIR-O-LIMIT DEVELOPMENTS

for Increased Speed and Greater Accuracy

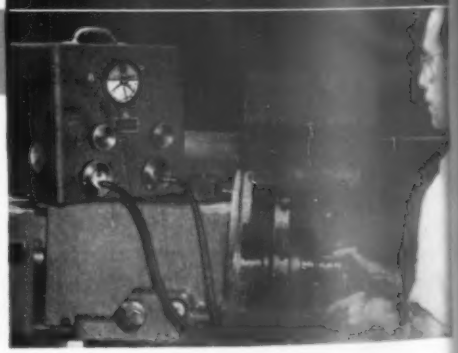
Air-O-Limit Snap Gages

The design of the new P&W Model F Air-O-Limit Snap Gage provides unusual interchangeability and flexibility for checking work in the machine and in the inspection department. With four different frames and one set of adjustable carbide anvils, diameters ranging from ½" to 2½" can be quickly and easily checked.

Contact Gaging Plugs

The new P&W Air-O-Limit Contact Gaging Plug has been developed for checking diameters where the roughness of the bore surface finish does not permit accurate readings with regular air gaging plugs. Its easy-entry bullet nose design and a *unique design feature which provides adjustment for setup and wear of the carbide contact gaging buttons* give greater accuracy of measurement and insure long satisfactory performance.

Duplex Indicator



The new P&W Air-O-Limit Duplex Indicator permits two station gaging with greater speed and accuracy. This P&W development incorporates *in one meter* two independent gaging indicators with individual pointers thus permitting dual readings on the same dial. P&W Duplex Indicators can be applied to many multiple station gaging fixtures.

PRATT & WHITNEY

Division Niles-Bement-Pond Company
WEST HARTFORD 1, CONNECTICUT

It pays to buy
GAGES
on a performance basis

Branch Offices and Stocks: Birmingham, Boston, Chicago, Cincinnati, Cleveland, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, Rochester, St. Louis, San Francisco

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-1

The Tool Engineer

Official Publication: American Society of Tool Engineers

Member: Audit Bureau of Circulation

Allan Ray Putnam
Business Manager
Fay H. LaRoue
Circulation Manager
Michael Jakcsy
Production Manager

Editorial

Gilbert P. Muir
Editor
A. E. Rylander
Technical Editor
Doris B. Pratt
A.S.T.E. News Editor
Robert Steiger
Art Editor

Advertising

Clarence T. Etter
Advertising Manager
James E. Hartnett
Western Manager, 540 N. Michigan Ave., Chicago, Ill.
Austin G. Cragg,
Eastern Manager, 400 Madison Ave., New York, N. Y.
Henry & Simpson
Pacific Coast Representatives 816 W. 5th Street Los Angeles 13, Cal.

Editorial Committee

W. F. Sherman
Chairman

Officers

H. L. Tigges
President
J. J. Demuth
First Vice-President
H. E. Collins
Second Vice-President
Roger A. Waindle
Third Vice-President
W. B. McClellan
Secretary
G. A. Goodwin
Treasurer
W. A. Thomas
Asst. Secretary-Treas.
H. E. Conrad
Executive Secretary

Board of Directors

H. L. Tigges, *Chairman*; L. B. Bellamy, H. E. Collins, J. J. Demuth, T. J. Donovan, Jr., R. B. Douglas, V. H. Ericson, Robert W. Ford, A. D. Lewis, Roger F. Waindle.

JUNE, 1950

Vol. XXIV No. 6

On the Value of a Magazine

Now that a half-year has passed of ASTE operation of *The Tool Engineer*, it seems a good time to pause and reflect on the value of a responsible technical magazine to its readers, to industry and to our Society.

A technical magazine is much more than an enterprise; it is a vital link among its clients. Its clients comprise two important groups: readers who are served by the editorial and advertising messages contained in the magazine; and advertisers who are presented with an opportunity to bring their messages to the tool engineer in his own home.

The Tool Engineer provides a service to its readers which is at once unique and yet is supplementary to other Society services. It covers technical developments on a wider geographic scale than is feasible in chapter meetings. It provides news on a broader scale than is possible with the limited number of technical sessions possible at national meetings. It supplements use of the Tool Engineers Handbook by providing the latest information on tool engineering techniques in, of course, greater detail. In its advertising pages, *The Tool Engineer* offers a monthly reference to the latest in production equipment and ideas.

Industry benefits in two important ways from The Tool Engineer. New methods and ideas which the magazine provides are the basis for significant reductions in production costs. At the same time, *The Tool Engineer* furnishes a direct route for his sales messages, taking it straight to the homes of a tremendously important buying group—ASTE's 18,000 members.

Continued use of these facilities by the groups *The Tool Engineer* serves makes possible even better and more comprehensive service in the future.

H. L. Tigges

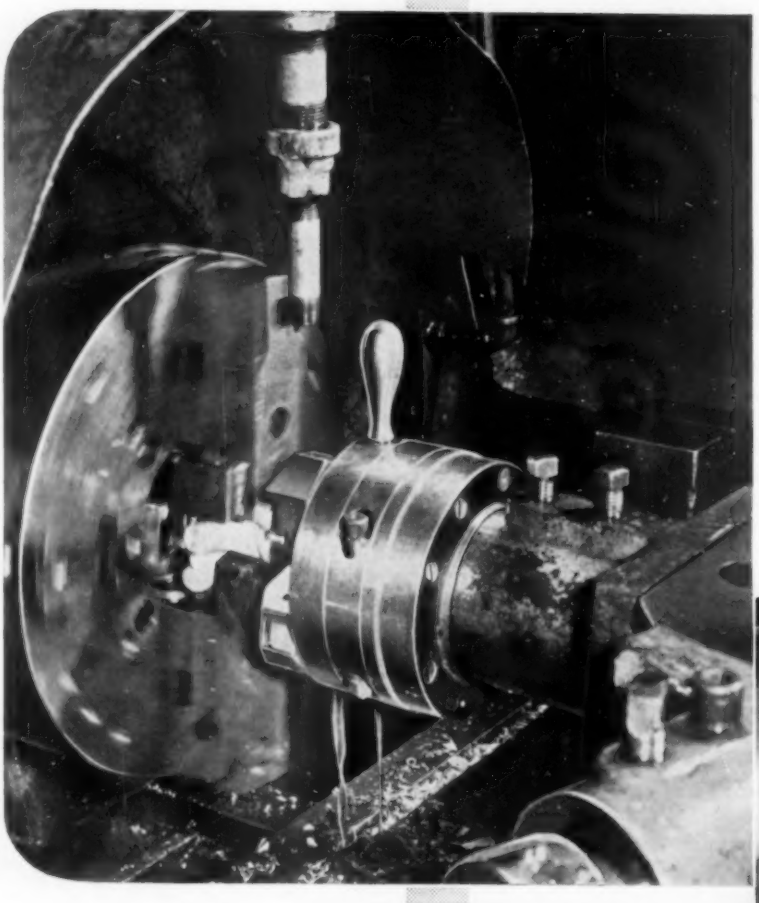
President 1950-51

THE TOOL ENGINEER is published monthly in the interest of the members of the American Society of Tool Engineers. Entered as second class matter, November 4, 1947, at the post office at Milwaukee, Wisconsin, under the Act of March 3, 1879. Yearly subscription, $2.00. Non-members, $6.00. Canada, $6.50; all other foreign countries, $8.00 per year. Copyright 1950 by the American Society of Tool Engineers.

OFFICE OF PUBLICATION (printing) 239 E. Chicago St., Milwaukee, Wis. **ADDRESS ALL CORRESPONDENCE TO: EDITORIAL AND ADVERTISING OFFICES:** 10700 Puritan Ave., Detroit 21, Michigan.

GOOD LEAD *on* THREADS

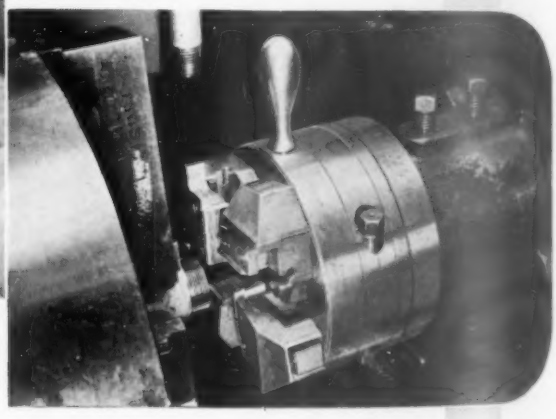
WITH LANDMATIC HEADS



The permanent nut action of Landis Tangential chasers assures accurate pitch threads throughout these crown port closing bodies used in bottling machinery. Landmatic Heads using Landis Tangential chasers cut 1⅝" 16 pitch USS threads ½" long on naval bronze forgings at the rate of 50 SFM. Actual threading time is about 5 seconds.

The permanent throat feature of the chasers maintains initial cutting accuracy throughout the entire life of the tool. When the chaser is reground, no grinding is done on the throat. Thus the throat angle and nut action is never altered, and the chaser consistently produces threads accurate for lead. Write for Bulletins F-80, F-90 & A-50.

These photographs were taken in the Machine Manufacturing Division of the Crown Cork & Seal Company, Inc., Baltimore, Maryland.

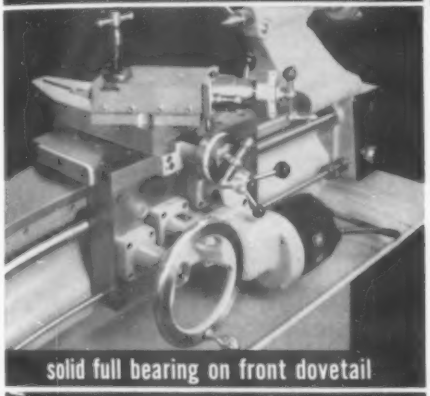


LANDIS *Machine* CO.

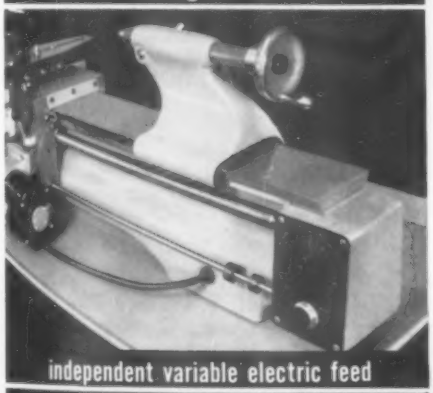
WAYNESBORO • PENNSYLVANIA • U.S.A.

solid full bearing on top of bed

solid full bearing on rear dovetail



solid full bearing on front dovetail



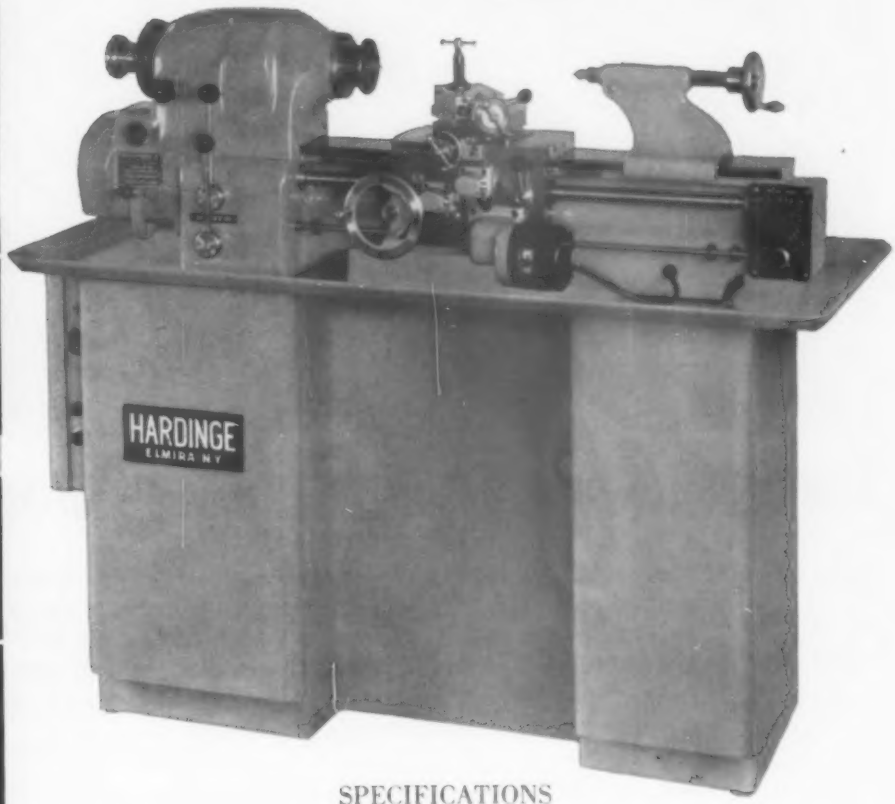
independent variable electric feed

HARDINGE
ELMIRA, N.Y.

THE MODERN DESIGN LATHE

Model HL

6 New EXCLUSIVE HARDINGE FEATURES



SPECIFICATIONS

Round Collet Capacity—5C HARDINGE	1″
Swing Over Bed	11″
Center Distance	18″
Spindle Speeds	140 to 3100 r.p.m.
(Other Speed Ranges Available)	

gear box for threading only

solid hardened and ground steel dovetail bed ways

DIAMOND ANNIVERSARY
HARDINGE
ELMIRA, N.Y.
1890 - 1950

Offices in principal cities. Export office 269 Lafayette St., New York 12, N. Y.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-3

Illustrating some of the many parts which have been profitably broached. Included below are wrenches, pliers, wheels, spindles, gear blanks, clutch hubs, and many others.

Cut Production Costs by Broaching the *American* Way

The parts shown are excellent examples of the wide variety of irregular shaped parts that can be broached. In this photo there are serrations, slots, notches, radii, and flat surfaces which have been surface broached. There are involute splines, rectangular holes, helical splines, serrations, and round holes which have been internally broached. If you produce parts requiring similar machining, you should . . .

INVESTIGATE BROACHING

There are several ways in which broaching can lower costs and improve production. On multiple station units a part can be broached at each station at the same time, greatly increasing the production, or each station can broach a different surface thus completing two or more operations on a single part. Completely automatic continuous broaching cycle, with the operator only loading the magazines, can also be provided when the part permits, for exceptionally high production requirements.

INVESTIGATE *American*

American engineers will work with you to simplify your metal cutting problems. Consult American and get the advantages of a complete broaching service. American builds every type of broaching machine and provides a size and capacity to handle every broaching need. They will design and build your broaches and the work fixture to give you the maximum benefits of broaching. Write to American. If you can, send a part print or sample part, and hourly requirements. Write Dept. T.

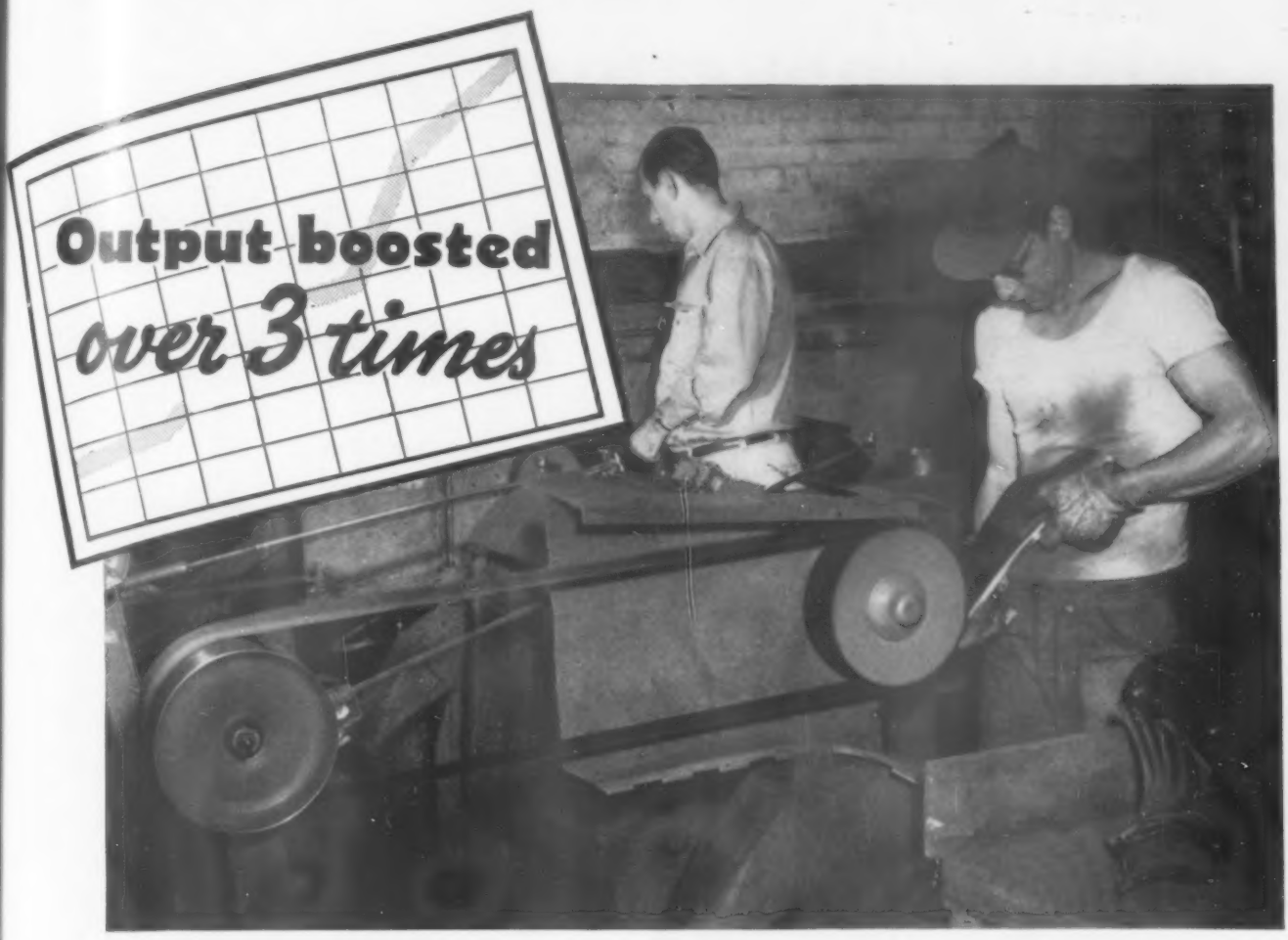
AMERICAN

American BROACH & MACHINE CO.

A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

ANN ARBOR, MICHIGAN

See *American* First—for the Best in Broaching Tools, Broaching Machines, Special Machinery



with SPEED-WET METALITE® CLOTH BELTS

Finishing with Behr-Manning belts and engineering advice pays off, as this case demonstrates. These cold rolled steel car visor ends were being finished at the rate of only 12 to 15 pieces per belt until the Behr-Manning Fieldman came in and demonstrated how SPEED-WET METALITE Cloth Belts could do the job at a terrific saving. Now using rugged, heavy-duty, all-resin bonded SPEED-WET METALITE Cloth Belts, pieces are rolling off the line at a rate of 40 to 60 per belt.

How about your finishing and polishing operations? Whatever the material or shape, Behr-Manning belt methods may be able to boost your output and slash costs. Let one of our field engineers give your work the "belt test" in your own plant or in the nearest Behr-Manning completely equipped local demonstration room. Check with us about this now.

GET THIS NEW BULLETIN

Here's the latest about belt finishing and polishing. It's "loaded" with illustrations and helpful data. Write today for your copy to Dept. TE-6

BEHR-MANNING®

BEHR-MANNING

TROY, N. Y.

Use NORTON® *abrasives sharpening stones*

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-5

HIGH PRODUCTION with

WINTER PIPE TAPS

Leak-proof pipe joints on a production basis in all types of metals require pipe taps that combine precision with high performance.

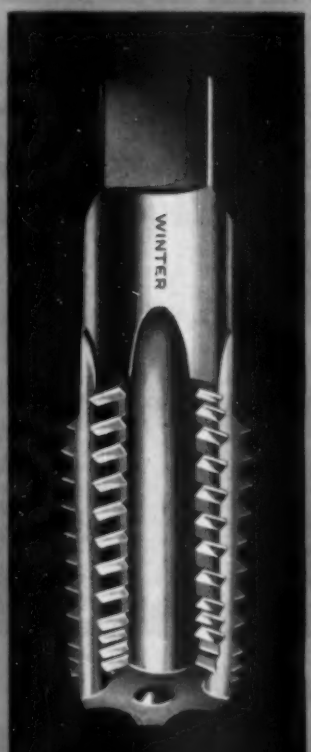
Winter "Balanced Action" Pipe Taps are the result of study and long experience in this field. Regular styles, Interrupted Thread, and Dry Seal styles are all available.

Special Pipe Taps for stainless steel and other difficult materials, as well as taps for unusual applications, are designed to your requirements by experienced Winter Tap Engineers.

Winter also makes and stocks Hand, Machine Screw, Chip Driver, Pulley, and Nut Taps, and many other types and sizes of threading tools.

ALWAYS AT YOUR SERVICE

YOUR LOCAL DISTRIBUTOR carries a complete stock of WINTER Taps on his shelves—as close to your tapping problems as the telephone on your desk.



WINTER

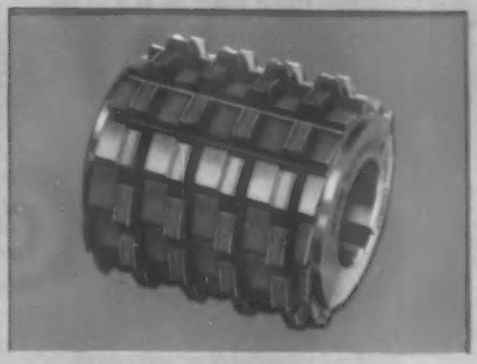
WINTER BROTHERS COMPANY • Division of the National Twist Drill and Tool Company, Rochester, Michigan, U. S. A. Distributors in Principal Cities • Branches in New York, Detroit, Chicago, San Francisco

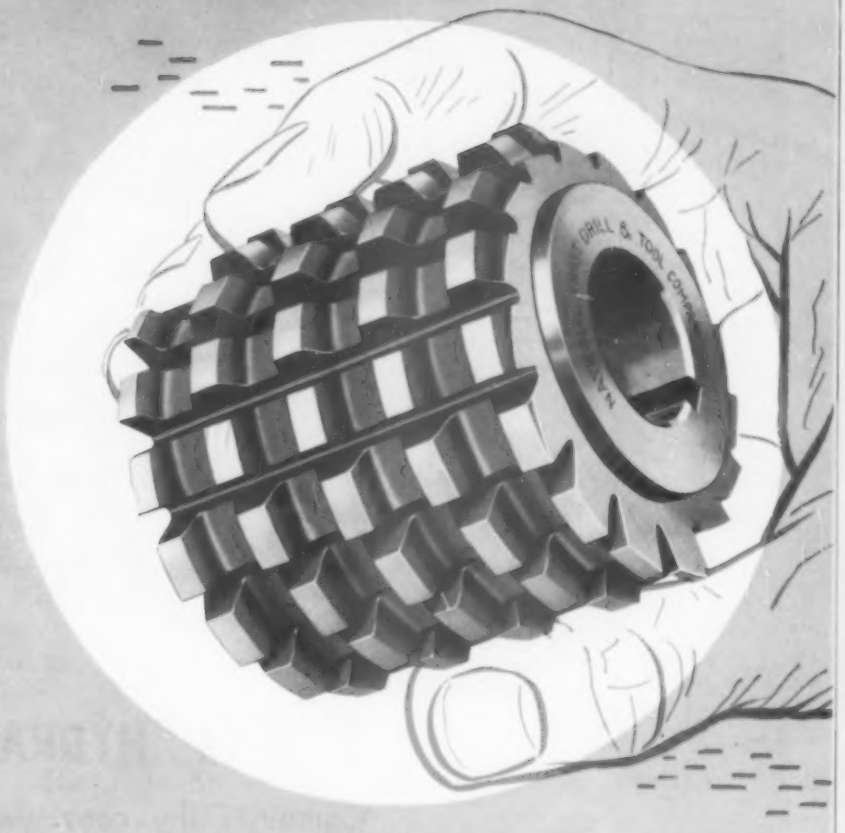
ACCURACY and LONG TOOL LIFE with NATIONAL HOBS

For continuous cutting of gear teeth, splines, and other symmetrical projections, the hobbing process is recognized as a most efficient method. However, both work accuracy and hob life depend on the quality and precision of the hob itself.

National Hobs have the inbuilt qualities born of sound engineering, exact processing, and long field experience. Furthermore, National hob specialists are always ready to assist you on new or troublesome jobs.

Other National products are Twist Drills, Reamers, Counterbores, Milling Cutters, End Mills, and Special Tools.





"CALL YOUR DISTRIBUTOR"— It is NATIONAL'S firm belief, based on long experience, that the local industrial distributor is the one best source for all staple industrial needs—including NATIONAL Metal Cutting Tools.

NATIONAL TWIST DRILL & TOOL ROCHESTER, MICH., U.S.A.

National

NATIONAL TWIST DRILL AND TOOL COMPANY • Rochester, Michigan, U. S. A. Distributors in Principal Cities
Factory Branches: New York • Chicago • Detroit • Cleveland • San Francisco

Faster Production Grinding . . .
Better Tool Room Grinding . . .

That's what you get with this NORTON SURFACE GRINDER

8" x 24" HYDRAULIC SURFACE GRINDER

Combines the convenience of simple controls and the ruggedness for high production manufacturing operations with the high degree of accuracy and adaptability for a wide variety of tool room grinding.

Easy to set up — easy to operate — and hard to beat for quantity and quality of work.

Send for Catalog No. 190-3

NORTON GRINDERS

M-587

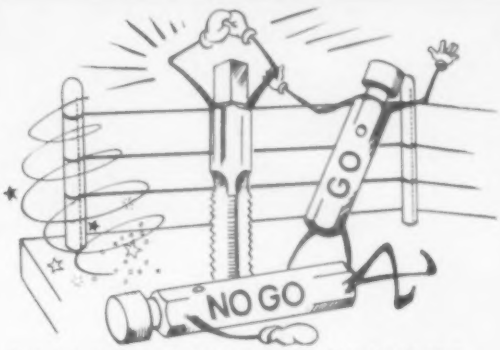
NORTON COMPANY, WORCESTER 6, MASS · New York · Chicago · Detroit · Cleveland · Hartford · Distributors in All Principal Cities

Remember when you were a "gay young blade"—
What a difference some extra cash always made?

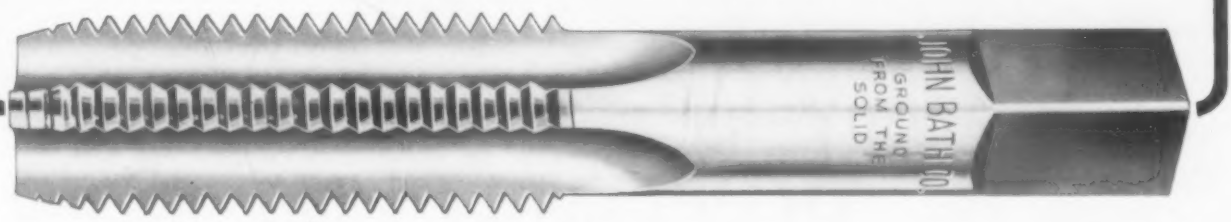
You tapped the bell of a dizzy "jane
A bit off-center with your wobbly cane

JOHN BATH CO. INC. · WORCESTER · MASS

When a tap is "cocked"—or a bit out of line
Your production of bell-mouth holes'll be fine!



Just use care in alignment . . . a holder that's true
And Bath taps'll make perfect threads for you!



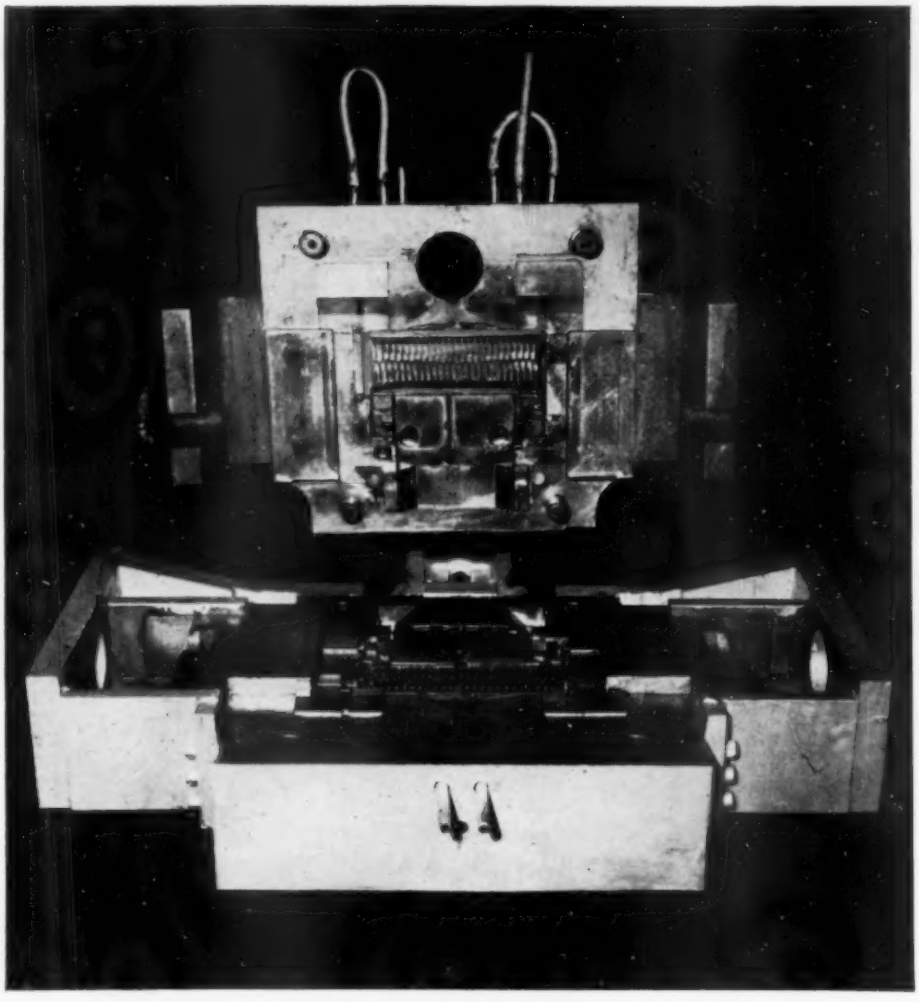
INSIST ON BATH TAPS . . . PROFIT BY THEIR PLUS-PERFORMANCE

Bath Taps are precision cutting tools. They are ground from the solid after hardening to maintain accuracy. Give Bath Taps the same care and consideration you give any precision cutting tool and you'll get TOP PERFORMANCE. To avoid bell-mouth holes we recommend reasonable care in the alignment of a true running Bath Tap with the hole — which will consistently produce quality threads and will increase tap life. If you are having "threading troubles"—call your nearest BATH representative or write direct for engineering assistance.

PLUG AND RING THREAD GAGES • GROUND THREAD TAPS • INTERNAL MICROMETERS

JOHN BATH CO. INCORPORATED
28 Grafton St., Worcester, Mass.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-9



And it doesn't have to be **TYPEWRITERS** you're die casting!

Accuracy calls for POTOMAC M

HOT-WORK DIE STEEL

"HOT-WORK STEELS"

is the title of a new, six-page folder that tells about the chromium, molybdenum, vanadium Hot Die Steel known as POTOMAC M—and also covers other grades for other hot-work operations. Secure your copy —*write today!*

ADDRESS DEPT. TE-6

In the precision casting of aluminum, POTOMAC M Hot-Work Die Steel is especially favored as the material for die-casting dies because its properties help assure accuracy of the steel itself *after* heat treatment. Die makers have found that size changes are held to a minimum.

Dimensional stability is thus the *first* contribution that POTOMAC M makes to accuracy.

Production accuracy of the die after it is in service is maintained also by the resistance of POTOMAC M to wear, to heat checking, and to metal wash.

Allegheny Ludlum makes a complete line of steels for hot-work tooling of various kinds—so, whether your need is the mass producing of duplicate parts or fabricating a few of them, call up "A-L" every time for hot-work counsel or service or both. Tell us your requirements.

ALLEGHENY LUDLUM
STEEL CORPORATION
Pittsburgh, Pa.

TOOL STEEL DIVISION: DUNKIRK, N. Y.

Fine Tool Steels Since 1854

AL

W&D 2484

JUST A FEW OF THE MANY

NEW Starrett PRECISION TOOLS

described and illustrated in the latest

STARRETT NEW TOOLS BOOKLET

If you buy or use tools, you need this important supplement to the big Starrett Catalog.

GET YOUR FREE COPY TODAY

Remember! All Starrett Tools Excell

No. 1015

STARRETT PORTABLE HAND DIAL GAGES

With Direct Reading or Balanced Dial

No. 653

STARRETT DIAL COMPARATOR

With Fine Vertical Indicator Adjustment

No. 652

STARRETT UNIVERSAL DIAL BENCH GAGE

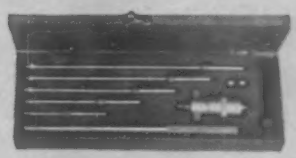
With Sliding Table and Fine Adjustment

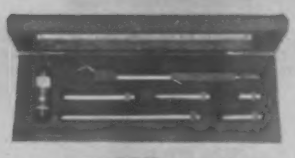
ALL FOUR WITH STARRETT NO-GLARE "SATIN CHROME" FINISH

No. 231

MICROMETER CALIPER

1" Capacity, Tapered Frame, Sycamore Case





No. 124

INSIDE MICROMETER

With Solid Rods

No. 823

INSIDE MICROMETER

With Tubular Rods

A Choice of Two Excellent Inside Micrometers — Two Different Types to Meet Your Requirements

No. 711-E

STARRETT "LAST WORD" TEST INDICATOR

With Universal Friction Holder, Universal Shank and many useful attachments

No. 354

STARRETT VERNIER HEIGHT GAGE

With Slotted Base Permitting Measurements from Base Surface. Range 0 to 6 inches.

No. 445

No. 440

MICROMETER DEPTH GAGES

A Complete Range of Micrometer Depth Gages with 2½, 3, 4 or 5 Inch Bases

No. 995

STARRETT UNIVERSAL PRECISION GAGE

(Patented)

With Fine Adjustment, Offset Foot, Scribing Attachment, In-Built Level and many other Versatile Features

TRADE MARK

Starrett

REG. U. S. PAT. OFF.

STANDARD OF PRECISION

Buy Through Your Distributor

Mechanics' Hand Measuring Tools and Precision Instruments
Dial Indicators • Steel Tapes • Precision Ground Flat Stock
Hacksaws, Band Saws and Band Knives

RESERVE YOUR FREE COPY NOW

THE L. S. STARRETT CO., ATHOL, MASS., Dept. E

Please rush my free copy STARRETT NEW TOOLS BOOKLET describing the many new Starrett Tools.

Name .....

Position .....

Company .....

Address .....

City ..... Zone ..... State .....

NIAGARA ANNOUNCES

a complete new line of

SOLID ONE-PIECE Steel Frame Presses

Straight Side, Double Crank

Made in sizes up to the maximum tha can be shipped on a freight car. (Large sizes are four-piece tie rod construction)

Furnished with Niagara Air Actuated Electrically Controlled Sleeve Clutch o sizes up to 6½" shaft. Plain or singl geared, single end drive.

Furnished with Niagara Pneumatic Fric tion Clutch on sizes 4½" to 12" shaft Single geared or double geared, single end or twin drive.

Made in lengths up to 96" between gibs (Longer lengths are tie rod frame con struction).

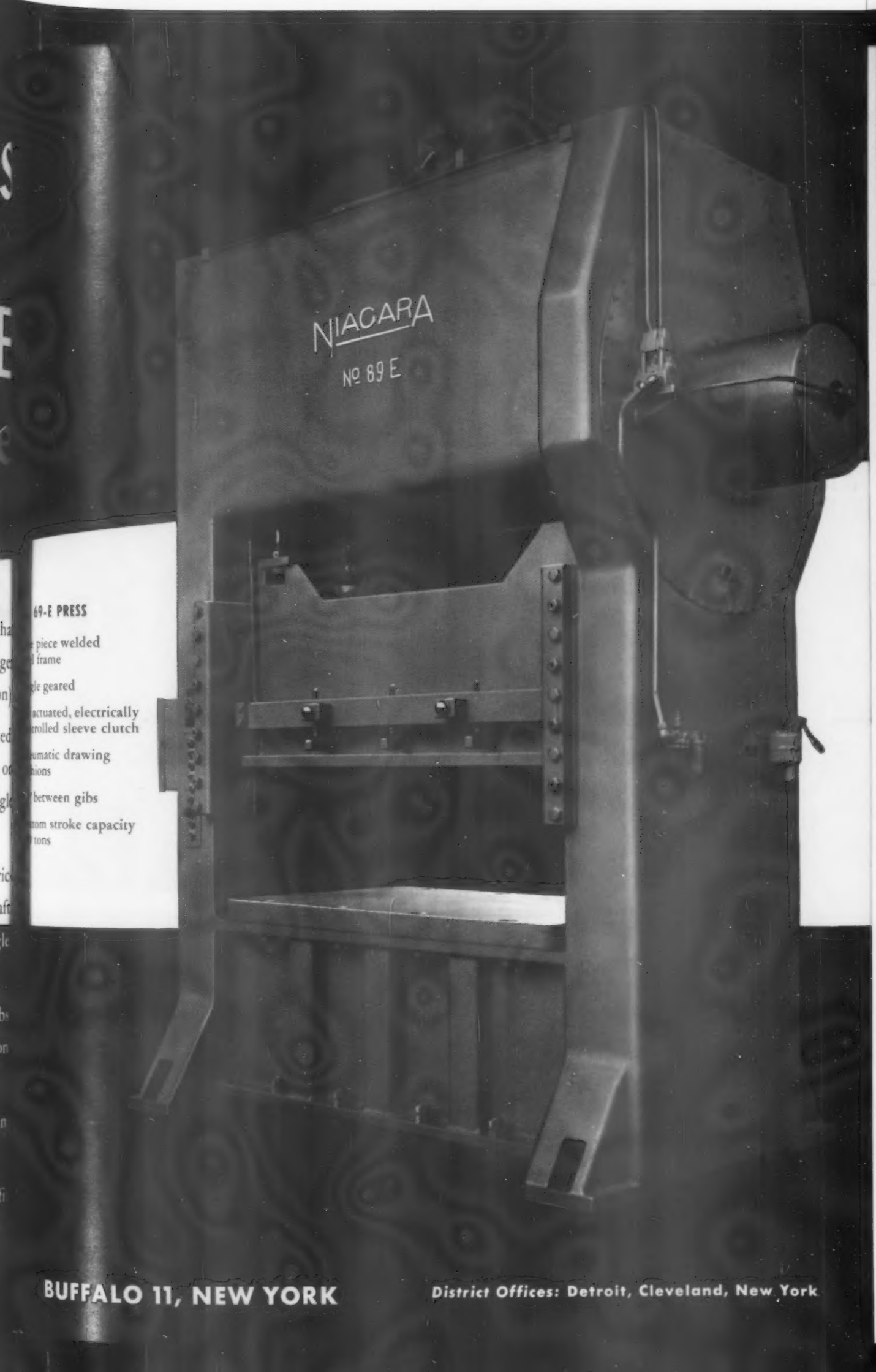
Niagara Pneumatic drawing cushion available.

Write for specifications on sizes to fi your requirements.

MANUFACTURERS OF

Presses, Shears, Machines and Tools for Plate and Sheet Metal Work.

NIAGARA MACHINE AND TOOL WORKS,



69-E PRESS

- piece welded
frame
- gle geared
- actuated, electrically
trolled sleeve clutch
- umatic drawing
tions
- between gibs
- om stroke capacity
tons

BUFFALO 11, NEW YORK

District Offices: Detroit, Cleveland, New York

WHAT ARE THE 4 BASIC ESSENTIALS OF MAXIMUM CUTTING TOOL PERFORMANCE?

HOW CAN YOU BE CERTAIN OF MOST EFFICIENT CUTTING TOOL APPLICATION?

Here's a book every Tool Buyer should see!

SEND FOR YOUR FREE COPY OF "A GUIDE TO BETTER CUTTING TOOLS" NOW!

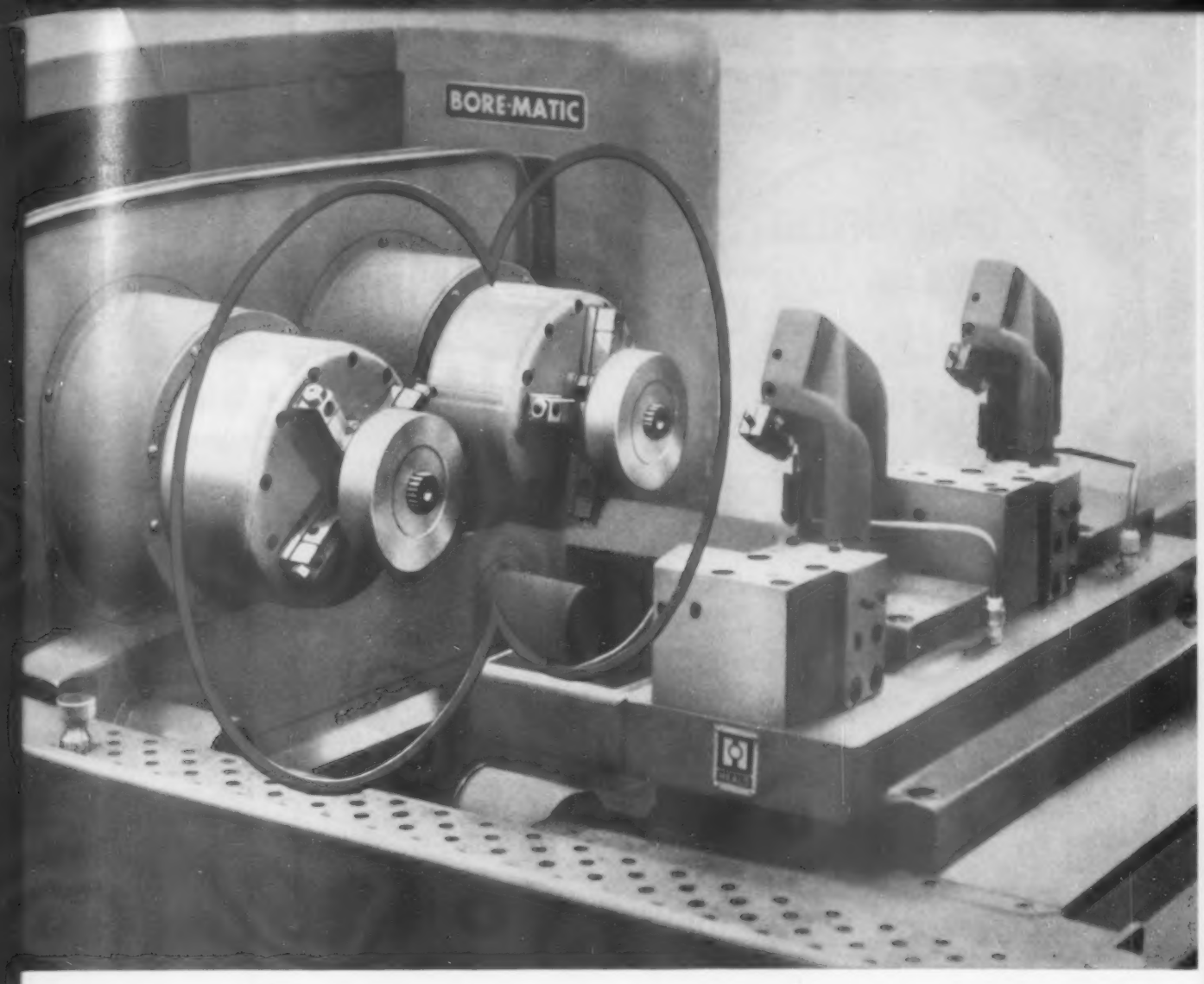
Twenty illustrated pages show more than 40 different cutting tools, standard and special . . . and tell you the importance of what's *behind* the cutting tools you use.

See how vital such things as tool engineering ingenuity and special production facilities are in the ultimate performance of metal cutting tools. Write for your copy of "A Guide To Better Cutting Tools."

ILLINOIS TOOL WORKS
2501 N. Keeler Avenue, Chicago 39, Illinois

ILLINOIS
TOOL WORKS

"HEADQUARTERS FOR ENGINEERED CUTTING TOOLS"



two heads are better than one!

The fundamental principle of doing two things at once to increase the amount produced is evidenced every day in Heald equipped factories the world over. Multiplicity of tooling and workholding equipment perform this simple A, B, C arithmetic just as surely as 1+1 equal 2. Naturally the implication is not only that two "heads" are better than one but any combination of multiple arrangements on both single and double end machines can mean increased output, greater savings for you.

New Heald model 321 Bore-Matic doubles production over previous methods

Before this Heald machine was installed, automobile clutch hubs were processed by separate operations on two machines. Now the entire job is done, twice as fast, in a single automatic cycle on the one Heald Model 321 Bore-Matic. The work is mounted on a splined arbor held in an air-operated diaphragm chuck on each boringhead. The O.D. is turned and chamfered and both faces generated by a tool block setup on the table cross slide.

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

HEALD

Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • New York

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-15

GUARANTEED *Against* SOLENOID BURNOUT

ELECTROAIRE AIR VALVE

The Bellows Electroaire Valve is a complete "packaged" air control unit, consisting of a four-way directional slide valve, solenoid controls, and piston speed regulators.

Designed to eliminate costly "down time" caused by power solenoid failures, the Bellows Electroaire Valve is unconditionally guaranteed against solenoid burnout.

Solenoid-controlled, *but air-powered,* the ELECTROAIRE Valve is compact to allow installation in crowded quarters; tiny as compared to solenoid powered valves of similar capacity. It's bullet fast, yet quiet and shock-free. It's simple in principle and construction, but packed with power. Thoroughly proven by successful use of thousands of units under exacting operational conditions by America's smartest production men.

Compact, safe, fast, reliable, the Bellows Electroaire Valve is guaranteed insurance against costly "down time" caused by solenoid burnout.

Write for this valuable free booklet today. Read how simply you can convert your air-powered equipment to fast, safe, guaranteed electrically-controlled operation.

Address The Bellows Co., Dept. TE-650, Akron, Ohio.

COMPLETE
SLIDE VALVE
ELECTRIC CONTROLS
EXHAUST BLOCK AND SPEED REGULATORS

● The Bellows Electroaire Valve is an integral part of the Bellows Air Motor (the air cylinder with the built-in valve and speed controls) and of all Bellows "Controlled-Air-Power" devices arranged for electrical operational control. It is available, as illustrated above for direct connection to, or remote control of any air cylinder, up to eight inches in size.

*Trade Mark Reg. Pat. Pend.

The Bellows Co.

AKRON, OHIO

Research--Its Application and Management in Manufacturing

By Louis J. Horn

TEXAS ENGINEERING EXPERIMENT STATION

THE INTENSE competitive picture created by two world wars and a major depression have made industry and business fast moving. They have demanded research of immediate application—moneymaking research. This is called applied research. It draws upon pure science for basic facts and applies them to specific problems arising in industry and business.

Industry is sold on research. An industrialist must have a research program in order for his business to survive. His economy is geared to improving his product, increasing production, utilizing waste materials, reducing costs, and expanding markets. It is now recognized that research creates the advantage in modern business competition. An industrial concern that conducts no research at all is staking its very existence in a wager that progress will not occur.

Purpose of Research

An industrial concern directs considerable of its experimentation toward making its products more useful, durable, and attractive for successful bidding in competition. Oftentimes such research is not continuous. Nevertheless a watchful eye is kept on comparison with competing products and research is activated as necessary.

Considerable research attention in industry is directed toward production processes and by-product development. Oftentimes in production processes improvement is accomplished by mere purchase of modern equipment after time studies and a cost analysis have been conducted in the plant. Usually, however, intensive design development and experimentation are necessary to improve processes.

New industries, especially in the synthetic and small products fields seeking a cheaper materials source, have placed value on many of the wastes resulting in manufacture by contracting for their purchase. Some industries prefer to turn such wastes into by-products. In some cases by-products of an industry attain market demand equal to and occasionally superior to its main products. Research by an industry to develop by-products is highly desirable and important to its economy. If suitable by-products can be determined, the industry has a decided economic advantage in their production.

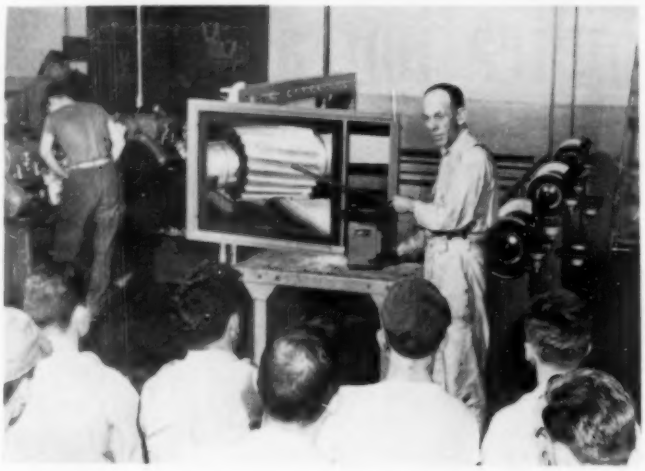
In addition to the technical activities involving laboratory setups, it is important that industries keep aware of the conditions affecting the product from final process to market. These conditions include those of shipping—transportation, unloading, storage—which present considerable cause for study. Oftentimes an industry too, in addition to its effort for development in improvement for direct economic benefit, is interested in solving problems important to the good will of the public which ultimately has considerable effect on the success of the industrial venture. These problems concern for example: waste liquors—polluting streams, destroying foliage and wildlife; smoke pollution—affecting the health and cleanliness of a community; and hazardous conditions—affecting the lives of the public. These can be studied by the qualified experts who are conducting the regular profit-motivated research for the industry.

Some time ago a strange phenomenon in the sea destroyed fish by the thousands and the tide deposited them on the beach of a coastal tourist city. Brief attempts were made without success to determine the cause of the nuisance. A chemical industry in the vicinity which was emptying some of its wastes into a stream flowing into the sea became fearful that public sentiment might soon be turned against it due to the circumstance of its location. The industry sponsored research on the problem at a nearby university and profited in good will by pointing out the real cause of the condition. It was a case of an industry sponsoring research as a contribution to scientific knowledge and benefiting by remedying an anticipated public relations problem before it could occur.

Industries Supplement Own Facilities

An industry's research laboratory can be supplemented through commercial laboratories and research institutions such as state engineering experiment stations and non-profit foundations. Also, a plant limited in capital, staff, and facilities with no experimental laboratory under its own roof can still conduct research within its budget. This is possible through arrangements with a commercial laboratory, the engineering experiment station at the land grant college of the respective state, or an endowed research foundation. The plant thereby becomes the sponsor of research of its own interest and for its own benefit. It enters into contractual arrangements for specific projects. These are then financed and maintained by the sponsor according to agreement. The sponsor then virtually has a laboratory just as the large industry does, except that he does not have the expense of overhead and upkeep and can terminate activities as his finances or research needs dictate.

Some commercial laboratories conduct full scale research programs for industries, others limit their services to testing and analysis. Usually they are in position to give prompt and continuous full time attention to the research problems and have that advantage to offer industries when time is an important factor. In conduct of the research the commercial laboratory can especially concentrate its efforts on only those phases of the development which would bring profit to the sponsor.



Training courses for employes and technical conferences for professional persons are among the services provided by research institutions. The machine group pictured above is receiving a lecture illustrated by daylight movies.

The engineering experiment station is set up in most states by legislative action to conduct research under such objectives as: developing natural resources, creating new industries, and providing better living for the citizens generally. Operating objectives of the endowed foundations are somewhat similar to those of the engineering experiment station but with special emphasis on industrial development. The main differences in the two are that the engineering experiment station coordinates to some extent through staff and facilities with the graduate school program of the college or university on whose campus it is located and that a substantial portion of the funds for its upkeep are from the state. The endowed foundation, while usually located on a college or university campus, is independent of the educational system and its funds come for the greater part from industrial and other private grants.

Research Facilities Varied

Many types of research endeavor can be accommodated in the usual state operated experiment station. The station has professional engineers directing the various research projects. These are top men in their respective fields of engineering. Some serve full time on research activities while others devote part time to instruction duties in the adjoining school of engineering. At the disposal of such a staff are laboratories especially well-equipped with scientific instruments, machinery, and other facilities. These result in some cases from both wartime research and postwar War Assets Administration surplus. Also at their service are highly trained technicians of various classifications, and when research coordinates in part with professional education, graduate students are available to participate in pursuit of the experimental objectives.

Contractual arrangements between the engineering experiment station and an industry for a sponsored research program cover such points as: finances, terms of payment, period of research, purchase and disposition of special equipment, patent rights, and scientific publication of results. An industry can maintain a contract and finance research over a period of years thereby virtually having its own research laboratory at the station at considerably less expense and also when it could not otherwise do so in its own plant.

A further service available at most engineering experiment stations is a technical information service. This enables an industry to obtain information on important problems of lesser scope which might not warrant being set up as experimental projects. Frequently such a service requires a mere question and answer type of attention, but experimentation can also be conducted if the problem submitted necessitates it. Engineers and designers can also make use of such a service. Also at hand is the scientific library to which the engineering experiment stations have ready access.

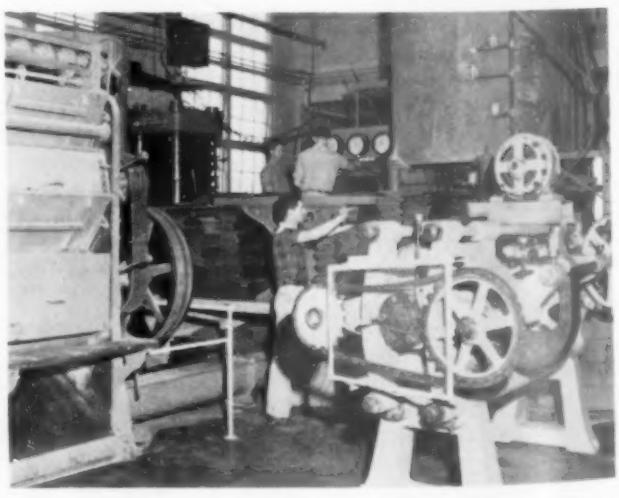
The engineering experiment station's scientific literature needs are either serviced wholly or supplemented through the main library of the college or university with which it is linked. Technical and scientific writings of the world over of a great many years accumulation are usually available. These works as well as the current technical and scientific happenings are readily available to a researcher for his literary searches in the field of the experimentation. Since no experimentation is conducted without first a literary search in that field, industry benefits by eliminating the expense of duplication of research when a search reveals existing information and sometimes results of previous experimentation.

Technical employes of a private industry can be schooled in the fundamentals of their work in short courses conducted in cooperation with the engineering experiment station. Such courses may cover from a few days to several weeks in time, and instructional staffs may comprise both station staff members and representatives of the co-sponsoring industry. Such courses bring employes abreast of latest technical advances of their fields and also provide the worthwhile experience of congenial associations which are important to employe attitudes.

Conferences for executives and professional persons of various industries and engineering fields are conducted for periods of from one to a few days and feature prominent speakers and discussions by delegates. These are usually arranged through cooperation with associations of industries, governmental agencies, and frequently technical societies.

Research Responsibilities

Applied research can be active only as long as it has adequate pure science data from which to progress. The universities and colleges over the nation have for generations through their faculty members added to the store of scientific knowledge. They have on their own or through sponsorship conducted basic research (pure science research). Philanthropists and industries have in the past made liberal endowments for basic research. The universities and colleges benefited for they had the funds to supplement the



Research to improve full utility of the manufacturer's product by the purchaser is profitable to both parties. Pictured here is cottonseed oil mill machinery which research has found suitable for extracting edible oils from various seeds.

research professors' salaries and to equip their laboratories. Basic research effort on their campuses also brought strength to the academic program and prestige for the institution through the scientific writings and resulting public acclaim.

During the past generation of approximately 1000 per cent increase in applied research activity, basic research has increased very slowly. The ratio of comparison shows that ten times as much applied research is being done as basic research.

Applied research is accelerating at a pace so far more rapid than basic research that concern is being felt in scientific circles. The concern for basic research was most emphatically expressed by the scientists of the Federal Government who were responsible for our national security during World War II. In coordinating all research facilities of the nation including the university and college laboratories, they noticed the decline of basic research. It was not keeping up with the demands made upon it and applied research in the future would suffer.

The concern for basic research is now becoming a little more widespread. However not too much is being done about it. In Congress a basic science bill is in process. In industry all effort and expenditure seems to be on applied research with very little worry of impending consequences of the future. While recognizing the need for basic research, they are less ready with funds for sponsorship of such than for applied research effort.

Since the colleges and universities have for ages been the seat of pure science research activity, they are carrying as much responsibility in this regard as funds permit. However, for assuring more adequate and continuing basic research progress, they need sponsor support. Such support can come from any direction—industry and business, trade associations, technical or scientific societies, and government.

Conclusions

Business and industry have recognized the importance of applied research. They are planning in that direction. Financial outlay for research by business and industry is quite generally being considered as an item exempt from taxation. If and when acknowledgement is made in this regard by the Federal Government, applied research programs will expand still more.

A most desirable plan is for a manufacturer to conduct as much of the research program in his own plant as possible and have as supplementary facilities the commercial laboratories and research institutions as sole facilities.

Whatever function is desired—a research laboratory, an employe technical training course, or a technical and scientific information source for engineers, designers, etc.—it is in reach of every manufacturer's budget.

Printed Discussions on Philadelphia Papers Available

The valuable discussion periods following presentations of technical papers at ASTE's Philadelphia meeting can be a part of the permanent library of every *Tool Engineer* reader. Verbatim transcripts were made of all these discussion periods, and the final edition, in edited form, is now available for immediate distribution.

Check off on the coupon below the transcripts desired, and forward the coupon or a facsimile, together with your remittance.

AMERICAN SOCIETY OF TOOL ENGINEERS
10700 Puritan Avenue
Detroit 21, Michigan

Send me..... copies each of the transcripts I have checked below. Price $0.25 per copy.

1. Developments in Pressworking of Metals
2. Cold Extrusion of Metals
3. Design and Use of Die Casting Dies
4. Automation of Turned and Ground Parts
5. Machining and Applications of Ductile Cast Iron
6. Machinability
7. Trends in Drilling
8. Industrial Applications of Metamics
9. Cold Roll Forming of Metals
10. Automation (in forging, heat treating, and the press room)
11. Tooling up for Modern Engine Production
12. Use of Element Time Data for Effective Tool Design
13. Hard Surfacing of Production Tools and Gages
14. Broaching Applications for Cost Reduction
15. Automation in Hopper Feeds for Assemblies
16. Design Economics
17. Investment Casting
18. Effect of American Standards on Lathe Spindle Deflections

..... copies @$0.25 each: total $.....

NAME .....

STREET .....

CITY ..... ZONE..... STATE.....

REMITTANCE MUST ACCOMPANY ORDER

Six Successful Precision Boring Techniques For Connecting Rods

By A. Francis Townsend
THE HEALD MACHINE COMPANY

PERHAPS NO OTHER single type of part has so many different approaches to finished machining as has the connecting rod. For though the job done by a connecting rod is always the same—linking source of power to use of power—the many individual considerations in its manufacture vary enormously.

For example, accuracy requirements are widely at variance between a connecting rod for a massive Diesel engine, and a connecting rod to be used in a compact, precision-built refrigeration unit. Such accuracy requirements result to a great extent simply from the size of the unit. And size itself is another factor in determining the method of finishing connecting rods. Few methods adapt themselves equally well to very large and very small parts. A third factor is, of course, material. A fourth is surface finish required. And when all these have been considered, still no decision can be made until we know production rate requirements, tooling limitations, and manpower experience.

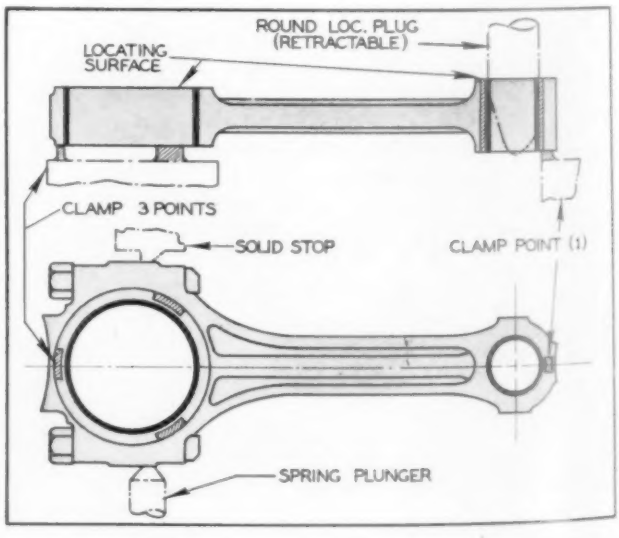
So it may be seen that a manufacturer could nearly afford to employ a "connecting rod specialist" to guide him in tooling up for this individualistic part. For there can be no generalization of approach to the machining of such a part.

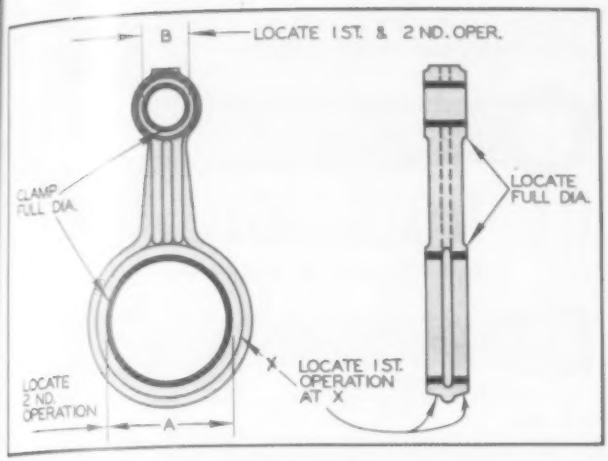
The six set-ups described here indicate that fact most clearly, because the methods and fixtures used are tailor-made in each case. Except for the fact that the method of actual cutting is common to all six, no general rules carry through. The cutting method is precision boring.

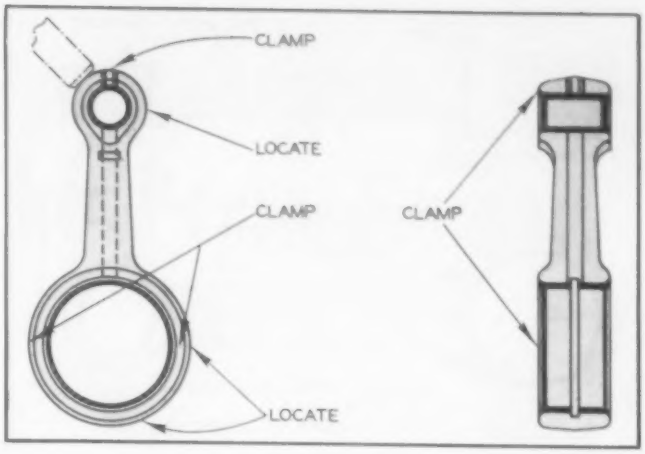
For example, Fig. 1 illustrates equipment used by an automobile manufacturer, who demands high productivity and close tolerances. The operator can run two machines, loading one while the other is at work. The location of three rods for simultaneous boring of pin and crank holes is extremely easy and rapid, done with a removable stud in the pin end and between a spring plunger and stop on the sides of the rod at the crank end. When the operator pushes the start buttons (one with each hand for safety) the hydraulic control brings clamps down against the rods, the chip guards come down with them, the location studs automatically retract, and six boringheads go to work on all holes, finishing the bronze bushed pin hole to 0.0005 in. and the steel crank hole to 0.002 in. A single machine on this setup produces better than 200 pieces per hour at 70 percent efficiency.

A small refrigeration connecting rod, just 4 in. between bores, requires a completely different technique. In Fig. 2 is shown the boring setup for such a rod, made of bronze. Accuracy requirements are high, productivity moderate. A hand-operated bayonet type plug locates the pin end precisely, while further location is by faces adjacent to the

Fig. 1. Machine set-up is shown here for a high precision, high production boring job. Set-up is such that operator can load one machine while a second is working. A single machine produces more than 200 parts per hour at 70 percent efficiency.







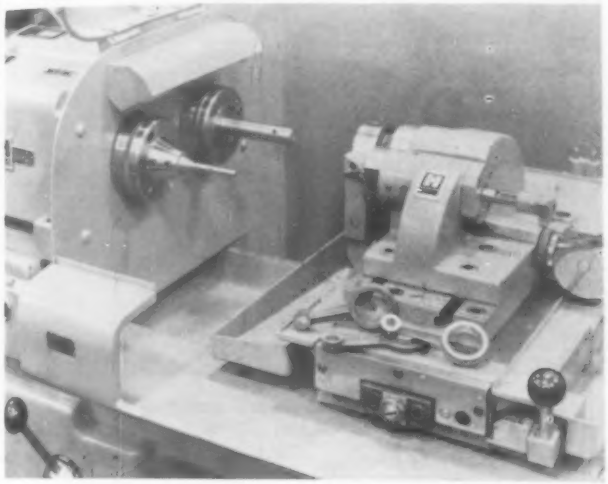


Fig. 2. Close tolerances with moderate production requirements are the factors involved in this boring set-up on bronze connecting rods for refrigeration use.

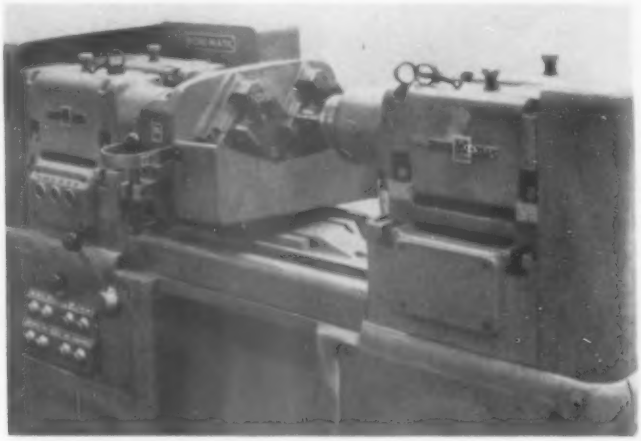


Fig. 3. A chamfer on one side of the crank hole is an added requirement on this job. Material is cast iron. Machine is the double end type with four boringheads.

bores and the OD of the crank bore. A simple cam-type arm pulls the clamp hard against the work, the bayonet plug is retracted, and the rod is ready for boring.

The close center-distance between the bores of this rod introduces a problem since the size of boringheads requires a certain minimum center distance. But the problem is easily handled in this installation by automatic indexing of the cross slide between the pin and crank bores. The work table rapid traverses to the left for boring of the crank hole by the rear tool, then quickly backs off, cross slide indexing to position the pin hole with the front tool, then rapid traverses to the left again for boring of the pin hole. The cycle is completely automatic.

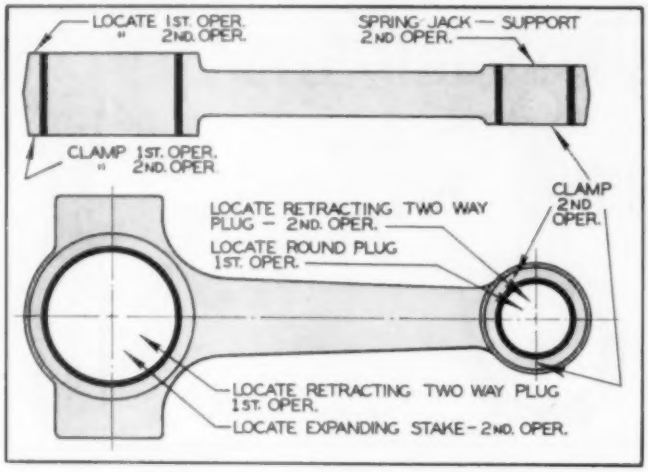
The part machined in the setup shown in Fig. 3 is similar to that just described, but the production requirements are greater, also an additional machining step is needed: a chamfer on one side of the crank hole. The material is cast iron. A double end machine with four boringheads is used, with the crank holes bored and chamfered when the work table moves to the right. Two rods are completed with each machine cycle. Location of work is from faces adjacent to bores, and from the OD of the bores. Clamping is hydraulic and the complete cycle is automatic with rapid traverse from left to right between cuts.

The technique of boring has resulted, in these examples, in increased precision both of finish and dimension, with elimination of final grinding or honing, and also in more exact parallelism between the two critical bores, eliminating extra straightening operations. This reduction of machining operations of course reduces costs. For those setups in which high production is an additional goal, it should be noted that advantageous use is made of multiple loading on quick-acting fixtures, multiple quills, automatic cycles, and rapid traverse of work during non-cutting periods of cycles. A constant feed throttle on the machine used makes it possible for the operator to set and lock the controls for a full day's run, regardless of changes in temperature and viscosity of the hydraulic fluid in the control system.

The angle plate fixture used in Fig. 4 is a universal type which is used in this application to accommodate three different sizes of rods. The crank hole of the steel rod shown is bored at the rear station, the work being located by a stud at the pin hole and stop locators at the OD and adjacent face of the crank hole. At the front station the part is reversed, precisely located by expanding stakes in the finished crank hole and stops at the pin end, and the pin hole is semi-finished and finished consecutively by two cutting tools on the same quill.

The production rate for the somewhat larger rod shown in Fig. 5 is not required to be high, hence a simpler, less expensive fixture is in order. The work is hand clamped, and location is between fixed and compensating centers at the top of the pin hole and on both sides of the crank hole. The two-step operation calls for rough boring in the crank end and semi-finish in the pin end, followed by installation of a bronze bushing in the pin hole and re-bore of both holes.

A comparison between Fig. 6 and Fig. 2 illustrates the adaptability of the boring method to the finishing of these specialized parts. The huge Diesel connecting rod in Fig. 6 is awkward to handle, yet the setup provides location and clamping of such accuracy that the finished bores are of a high degree of precision. Positioning is by positive stops endwise and on the faces adjacent to the bores. The tool moves to the work, here, boring strictly parallel holes. This is a


LOCATE 1ST. OPER.
" 2ND. OPER.
SPRING JACK — SUPPORT 2ND OPER.
CLAMP 1ST. OPER.
" 2ND. OPER.
CLAMP 2ND. OPER.
LOCATE RETRACTING TWO WAY PLUG — 2ND. OPER.
LOCATE ROUND PLUG 1ST. OPER.
LOCATE RETRACTING TWO WAY PLUG 1ST. OPER.
LOCATE EXPANDING STAKE — 2ND. OPER.

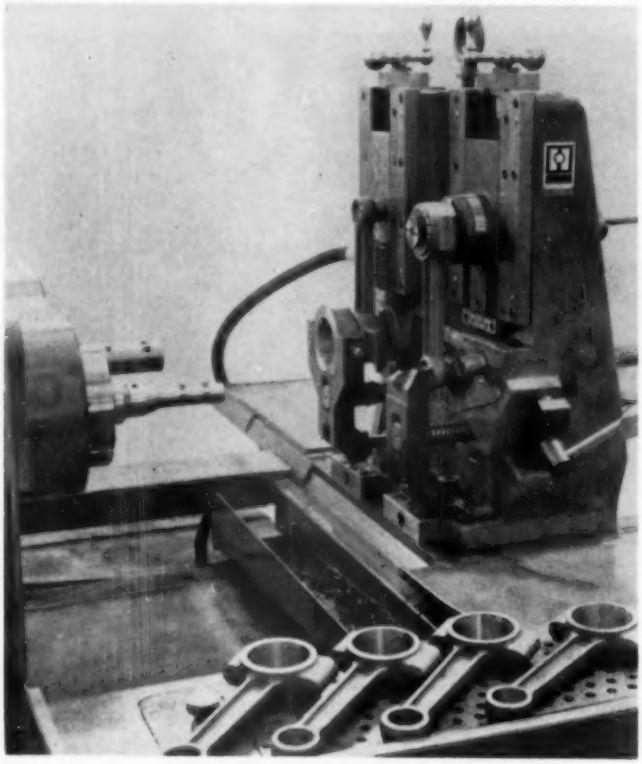
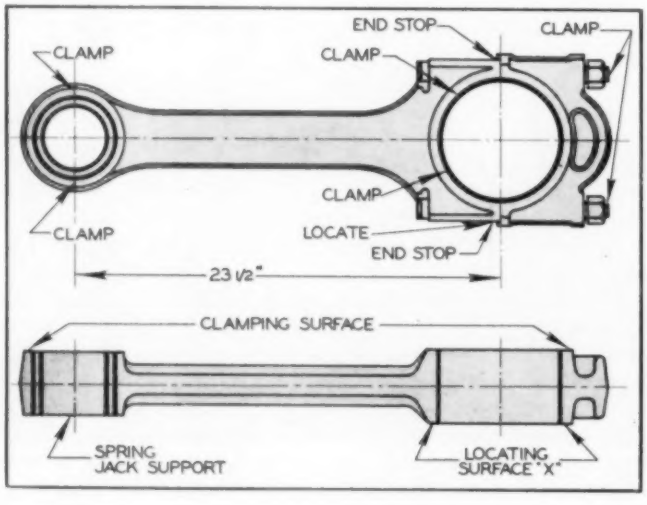
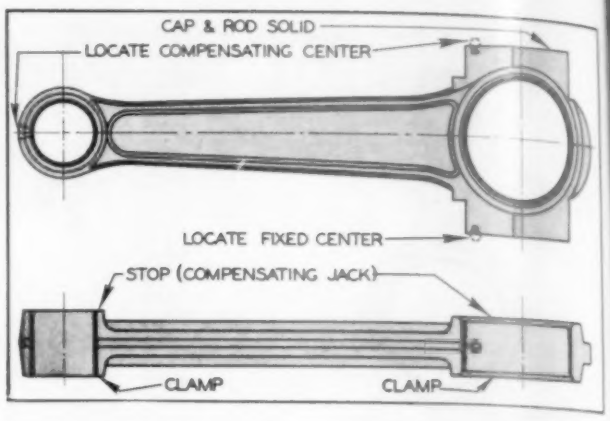


Fig. 4 (above) illustrates an angle plate-type fixture used in this application to accommodate three different sizes of rods.

Fig 6 (below) shows handling of a large Diesel-type connecting rod to achieve ease of handling with close tolerance work.





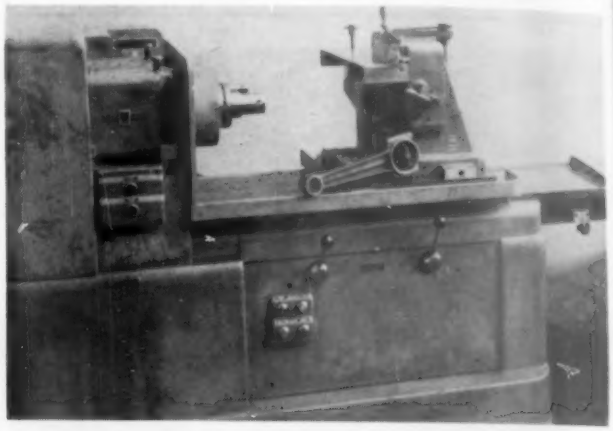
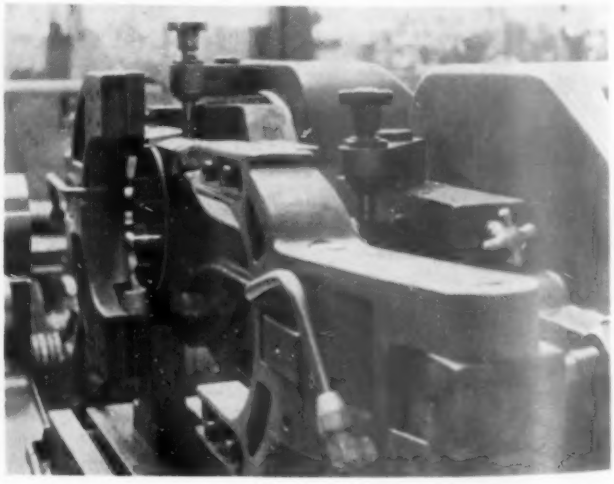


Fig. 5. Hand clamping is used on this connecting rod job, where production requirements are not high. Boring is a two-step operation.

most important consideration in rods of this size, since other methods of finishing have usually introduced the need for straightening and re-alignment operations after boring.

Although the requirements of the connecting rod jobs outlined here appear to run the gamut of size, precision and productivity, they must not be considered representative of any general "classes" of rods. The experience drawn from this variety of setups indicates that the technique of boring is capable of wide versatility and universality. Yet the combinations of factors which must be considered are infinitely varied, and the obvious conclusion to be drawn is that the machining of each rod should be attacked freshly and originally. In boring as the cutting method, fixturing, work cycles, and the other factors should be arranged in optimum relationship with each other to give the desired results.



Automation in the Press Room

By Herman F. Zorn

PRESIDENT
THE V & O PRESS COMPANY

A PRESS IS THE fastest production tool known to man. This high production tool can be made still more productive by automation—automatic devices such as roll, dial, bar, and grip feeds; transfer motions; hoppers; in addition to practical safety devices to protect the machine and its tools.

Roll Feeds

Roll feeds are probably the most commonly used automatic feeding devices applied to presses. They are available in either the single or double types and in all sizes from very small ones for feeding material around 0.0005 in. thick and of a very narrow width to those that feed material wide enough to make tops for automobiles. They are applicable to machines that operate at speeds of 2 to 3 strokes per minute and having several thousand tons capacity; to presses operating at speeds up to approximately 1000 strokes per minute and having 2 or 3 tons pressure capacity. Roll feeds are mounted on almost every conceivable place on the press.

When and Where to Use a Single or Double Roll Feed

A single roll feed is used to especial advantage when a part is made and completed without leaving a skeleton; that is, the material is fed through the roll feed to the die, and the part is completed without leaving any scrap to be carried on after the finished piece is cut off. It usually works out to advantage, however, to use a double roll feed. In the latter application when material is started into the die, one feed will move the material through the die until it reaches the other feed. At this point the feeds operate simultaneously until the end of the strip is reached. The second feed then continues until the strip is completely fed. Double roll feeds, of course, are necessary on thinner materials to prevent buckling.

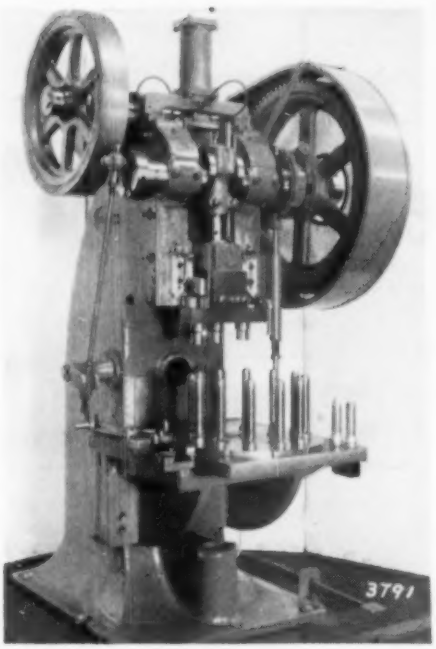
The accuracy at which roll feeds will operate is a problem which constantly confronts the manufacturer of feeds. In the final analysis a roll feed is not a measuring machine. Even though roll feeds are made to a high degree of precision and will feed accurately on short, flat strips, inaccuracies must be expected on the general run of materials. A variation in the thickness of the material (particularly sidewise), rough edges (especially sheared stock), and short kinks affect the gripping of the rolls, causing inaccuracies. When coiled material is used and the roll feed unreels the coil, unless the tension between the coiled stock and the roll feed is constant, the roll feed catches up with a taut piece of material and a jerk takes place on the coil. This, of course, affects the length of feed at that particular moment. With these factors taken into consideration, it is advisable whenever possible to feed against a stop—that is, a positive stop or finger stop. If the design of the part is such that it will not permit a positive or finger stop, pilots should be used. When pilots are employed the upper roll should be released, permitting the material to float so that when the pilot pin goes into the pilot hole the material is free to move. This permits centering of the blank or, material, correcting the possibilities of errors outlined above.

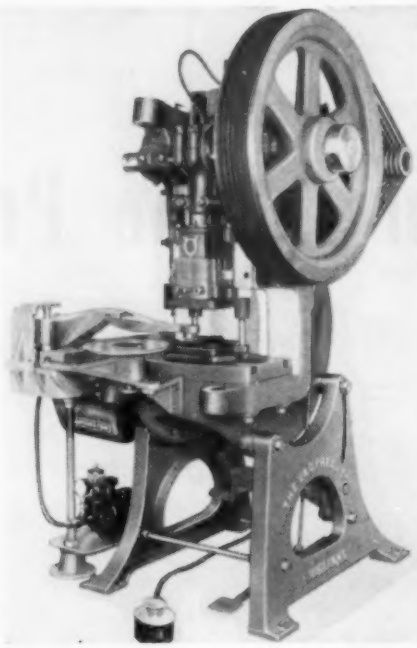
Roll feeds in general operate with very little attention, enabling an operator to oversee several machines.

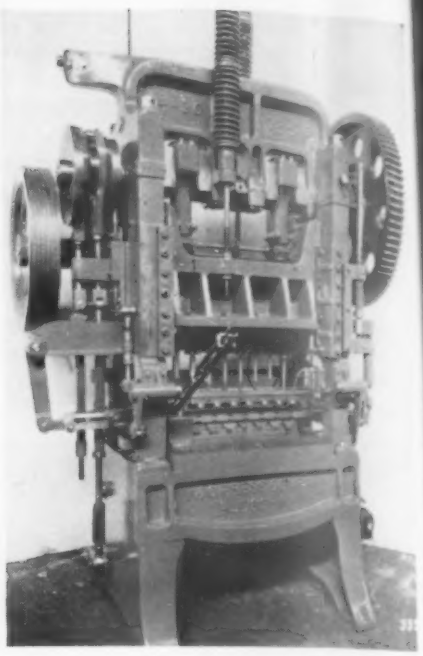
Grip or Slide Feeds

Grip or slide feeds employ an anvil as a lower member and a gripping finger as a top member which results in a biting action on the stock and propels it in its path to the tools. A positive stop at each end of the sliding member accurately controls its movement.

In conjunction with roll, grip, or slide feeds stock straighteners are recommended to eliminate curvature in the material. Scrap cutters are also recommended for chopping the scrap or skeleton material after it leaves the press.







(Left) This ring type dial feed with dies mounted on the dial is complete with automatic safety stop. The application is on a horning and wiring press. (Center) A combination of double bar feeds, chute feeds, transfer motion and automatic safety stop is applied on this press. (Right) A mechanical hand is seen in operation on this press, set up to lift stampings from the die.

Dial Feeds

While roll, grip, or slide feeds are used for primary operations, dial feeds are invariably used for secondary operations.

Dial feeds in general are circular conveyors, moving parts to the die or dies. At times dies are mounted directly on the dial plate and are carried to the various punches mounted on the press slide. There are four outstanding types (ring, disc, continuous friction, and intermittent friction). The ring type, the most prominent, lends itself to the greatest variety of work. As the name indicates, it consists of a ring having station holes or pockets to carry the work, which roates around a center plate mounted either directly on a special bolster or on a dial base. It is operated by an indexing pawl and locked in position by a locking pawl.

The disc type is similar in operation except that it rotates around a shaft instead of a center plate. The dial plate rotates continuously on the continuous friction type, carrying parts on its surface by friction rather than in pockets. It is driven from the press shaft by belts or gears. The intermittent friction driven type is propelled by a friction band instead of an indexing pawl.

The number of operations that can be performed on a part with the use of a dial depends greatly on the design of the part. It is quite common to perform from one to ten or twelve consecutive operations. However, when a number of operations are performed at one time it is quite necessary to have a well-supported and well-guided flanged slide on the press, as many of the operations take place quite a distance from the center of the slide. The limiting factor when a number of operations are combined is that it is necessary to maintain an outside dimension of the workpiece through all of the operations, since each station in the dial plate has the same shape. Many different jobs can be made on the same dial feed by changing the dial plate for various sized pieces. At times interchangeable bushings can be used in the dial plate, thereby saving expenses and facilitating set-up time.

Dial feeds, when used in conjunction with presses, are employed primarily to speed up production. In addition, they provide safety to the operator, as he performs his duty away from a point of danger. Thus, as soon as the operator realizes this protection he assumes a rhythm which is conducive to his capabilities. This point can best be reached by varying the speed of the machine. It works well to start such equipment at a slow rate of speed, stepping it up gradually until the most efficient tempo for the operator is reached.

Many jobs offer possibilities of being blanked on the same machine with the dial. With some of these it is also possible to perform several operations in a progressive step die, prior to blanking and feeding into the dial. This can be done only when a ring-type dial feed is used, as it is necessary for the die to bridge the dial plate. After the piece is blanked and dropped into the dial, it is carried around for the various subsequent operations.

In many cases it is practical to convey component pieces to the part that is being operated on, making it possible to assemble as well as perform individual operations.

Oftentimes these component parts can be made on the same machine, feeding the material with the use of a roll feed and making the part either in a progressive step or single die. The last station of the die is directly over the dial plate, so the finished part drops into position in the dial. Component parts can be made in another machine and transferred by means of a conveyor belt and fed into the dial feed by a transfer motion. Also, extra parts can be fed by hoppers, magazines or chute feed, making an expensive and complicated assembly comparatively simple and inexpensive. Dials lend themselves particularly well to hand-fed assembly operations. In many instances where several parts are to be assembled, the dial feed is of a large diameter, permitting room for a number of operators to work around its circumference and so arranged that each operator can feed a respective piece in position progressively at the proper station. Usually the last operator, or the one who feeds the final part in position, also acts as an inspector to see that the parts are completely assembled. In addition, he

has control of the press and can stop it or let it continue on. The speed at which dials operate depends largely on the skill of the operators who feed them. Dials can be operated either in a clockwise or counterclockwise direction, depending on what works out best for the particular job.

It is essential in performing multiple operations in a dial to have the press slide equipped with cam knockouts. Thus, after the operations are performed and as the slide moves up, the parts which are of such shape as to stick to the punch will be ejected from the punches at the proper time, leaving them in the dial plate to be conveyed to the next position. On some jobs it is also necessary to have the machine equipped with cam knockouts in the bed which will eject the pieces from the dies into position in the dial before it starts to move to the next position. After all operations are performed, the part or parts are ejected through or from the dial into a chute, to a tote box or to a conveyor which carries the parts away.

Safety Stop Design

For proper die protection an automatic positive safety stop should be employed. The automatic positive safety stop can be either a mechanical or electrical device. When a mechanical device is used it is best to operate it from the press shaft by a cam so arranged that after the dial has come to rest the cam permits a pin to drop into a hole in the dial plate. As long as everything is functioning properly this pin drops into position and the press continues to operate. In the event of a jam or if for any reason the dial does not register in its proper location, this pin rests on top of the dial plate, placing a lever in the path of the clutch release ring. This withdraws the clutch dog from the flywheel and the press stops before the punches come in contact with the work or the dial plate, thus preventing any breakage of punches or dies. As soon as the obstacle is removed and the dial again located in its proper position, the pin drops in the hole on the dial plate and permits the machine to continue its operation. The automatic safety stop should be so arranged that the press will stop at each stroke unless the dial is in its final registered position.

Quite often on dial feeds, in conjunction with the automatic positive stop, a solenoid is used to trip the machine. With the solenoid it is possible to use limit switches at different positions in the dial so that in the event of improper registration or on jobs where an assembly of parts is made, if a piece is missed or the component part is not fed, the limit switches automatically cut off the solenoid. This in turn shuts off the machine, eliminating the possibility of the machine continuing to assemble parts that are not complete.

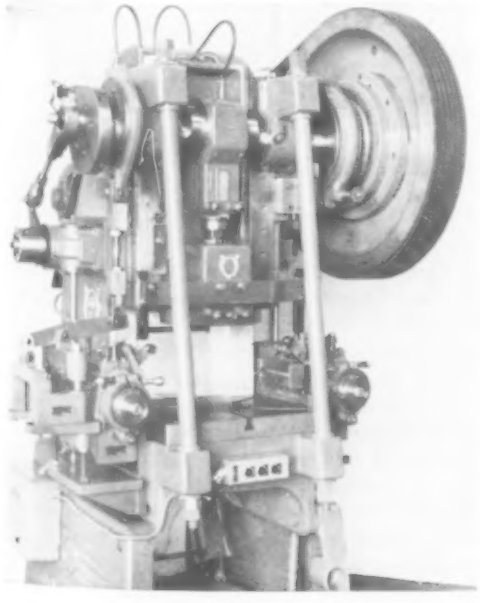
A number of advantages may be gained from attachment of an inspection plunger or plug to the positive safety stop operating shaft. For example, if a shell during certain operations must pass through the machine with the open end up, the inspection pad or plug working in conjunction with the safety stop drops into the shell. If not for any reason the shell is upside down or contains foreign matter, the plug cannot enter and this in turn alerts the safety stop and automatically shuts off the machine.

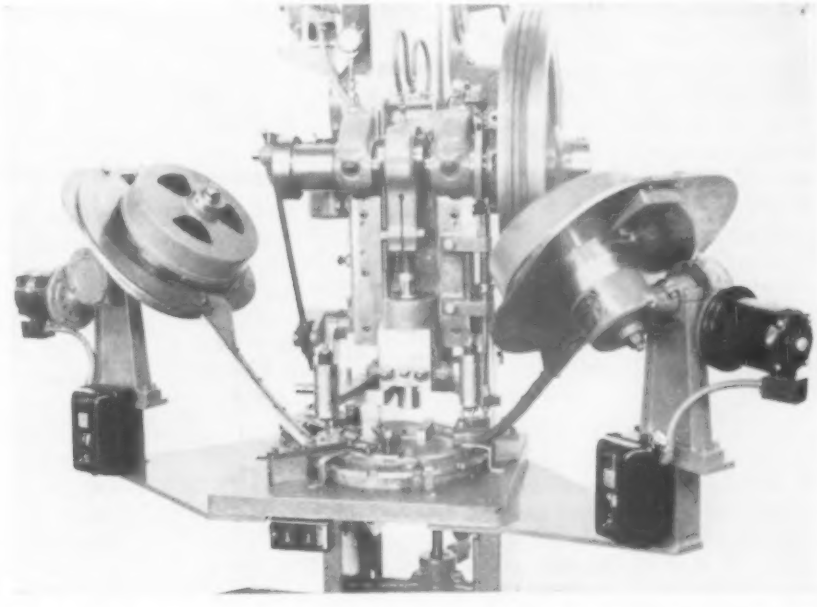
The accessibility of an inclinable-type press is the reason for the adaptation of dial feeds to a much greater degree than with other types of presses, although in a number of cases dial feeds are used with considerable success on straight side, horning, punching, knuckle joint and other types of presses.

Bar Feeds

Bar feeds are not as commonly used as roll, grip, or dial feeds. However, they have a definite place and fill a need that cannot be taken care of as effectively with other types of feeding mechanisms. They lend themselves particularly to the carrying or transferring of parts that require a number of operations, parts which change their shape considerably after each operation, and parts which cannot be carried along in the material, either because of their shape or from the standpoint of economy of the metal.

Bar feeds fall into two general types. One is a reciprocating, rectangular bar that is moved back and forth over the dies (guided in ways) by means of a cam on the press shaft and connecting levers, the movement or motion of the bar being from front to back. This type works particularly well





(Left) Double adjustable roll feeds and scrap cutter are appplied to this inclinable press. (Right) Two individually-driven hopper feeds are working in conjunction with a dial feed on this inclinable press. Setup involves hoppers, magazines, transfer motion.

with inclinable presses. However, in order to use this type of feed, the press must be equipped with many special features. It should be fitted with a cam knockout in the slide which can be set to strip the parts from the punches at the proper time in the cycle in order to leave them in the dies. The press also should be equipped with a lower slide (cam actuated) accurately guided in ways, to which can be attached a series of knockout pins or pads that will eject the parts from the dies into the path of the bar at the proper time in the cycle.

A roll or grip feed is generally used (in conjunction with the bar feed) to feed coiled or strip material, from which the blank is taken. After the blank has been taken out a scrap cutter is used to chop the skeleton. Where a bar feed is used on subsequent operations, a chute or magazine with a transfer motion is used to place the part into position in the bar.

All features must be set and timed very accurately so that all will coordinate and make an effective, smooth operating unit. The sequence of operations is as follows: The press is tripped, the slide descends and performs the first operation. As the slide moves up, the cam knockout in the slide operates, leaving the part in the die. Then the bar moves forward and the lower slide moves up, ejecting the part from the die into the bar. The bar moves back, transferring the part to the next station, placing it in the gages or set edges of the second die ready for the next operation. The part continues on until all operations are completed, at which time the finished part is ejected from the bar. After that, each stroke of the press produces a finished part. The number of operations that can be performed on a part varies considerably but three to eight operations are common.

This type of bar feed can be applied to small bench presses or the largest of inclinables.

The double bar feed is generally employed in connection with straight side presses. It consists of a double bar which functions from left to right or right to left of the press from cams on the crankshaft. These bars, in addition to having a motion right to left or vice versa, have a motion in and out and work in conjunction with fingers that are attached to them, moving the part progressively from the first to the last station. The method in which they function is as follows: after the part has been blanked and the first operation performed on it, the cam knockout in the slide strips the part from the punch, leaving it in the die. Then a cam knockout in the bed knocks the part out and into the path of the bar feed. The bar feed moves together, gripping the part on the circumference or periphery; then the bars move the part along laterally to the next position and holds it there until the slide descends and the punch contacts the part. Simultaneously the bars move out, leaving the punches and dies free from any fingers or other obstacles. The bars then move laterally to their original position and are again ready to repeat the cycle.

The double bar feed is commonly used when larger parts are processed, necessarily making it a slower operating feed than the other type described. If desired, a roll or grip feed can be employed at the first station to feed the material for blanking. The skeleton material can be chopped with a scrap cutter. If the parts can be made more economically, from a material standpoint; by being blanked, or blanked and drawn in multiples in a separate machine, they can be fed by means of hopper, chute, or magazine feed and transfer motion to the bar feed.

Regardless of which type of bar feed is used, an automatic positive safety stop is necessary to insure proper positioning and locating of the bars and parts in order to avoid jams or die breakage.

The "Mechanical Hand"

The "mechanical hand" incorporates fingers or a vacuum cup, and automatically feeds parts from a nesting plate to a standard punch press. As the mechanical hand returns for the next piece it automatically trips the press and the finished part is ejected by air from the die.

The mechanism is provided with safety control which prevents tripping of the press unless the blank is correctly placed in the die. Longer die life results because the mechanical hand places the blank accurately.

The operator, whose hand is never under the punch or in danger, is not tired at the end of a day's work for it overcomes completely the fear of hand feeding and the strain of foot tripping.

The device is applicable to all sizes of inclinable presses as well as straight side, knuckle joint, and other types.

The Technique of Micro-Drilling

By J. A. Cupler

GENERAL MANAGER
NATIONAL JET COMPANY

MICRO-DRILLING BEGINS when the factors governing an operator's treatment of a drill and technique in using it are no longer apparent to him without the aid of sensitive drilling equipment and optical aids. My reference here is to cuttings and the story they have to tell to the operator concerning the quality of the cutting edges of the drill itself and the peculiar nature of the material which is being drilled—in short, its machinability or drillability.

Drill Life

In micro-drilling the specific factors affecting drill-life according to our observations are as follows:

1. The material or alloy from which the drill is made.
2. The physical structure of the drill, that is, if a twist drill, web thickness, point angle, rake angle, and cutting clearance on the side of the drill. If a pivot or spade type drill, web thickness, point and rake angle and back taper or clearance on the drill blade itself. The points and rake angles of drills must be made to conform to the requirements of the particular material which is being drilled. The point angles will vary normally from 118 deg for soft materials to approximately 135 deg for harder materials and the rake angles from 8 deg to approximately 15 deg over the range of conventionally drillable materials.
3. The rpm of the drills, since this rpm necessarily varies in the drilling of different materials, is one of the major factors affecting drill life or the lack of it.
4. With specific reference to micro-drilling, the most vital factor affecting drill life is the trueness or concentricity with which the drill turns.

It is very difficult, if not impossible, to develop an adequate chart pertaining to speeds and feeds in the drilling of various types of materials when using small and microscopic drills, since there are so many variables and influencing factors. With respect to speeds and feeds, there is no such thing as a straight-line curve relationship between the two. Although in some cases speeds of 7,000 rpm have been used successfully, it can generally be depended upon that speeds in excess of 4,000 rpm for drills as small as 0.020 in. diameter are impracticable. Speeds not in excess of 2,800 rpm generally will give the most satisfactory results as to hole quality and drill life regardless of the material to be drilled. These rules on rpm are based on maximum drill life, maximum hole quality coupled with duplication of hole size over many hundreds of holes. Deviation from these basic rules will not result in inability to drill, but a penalty will be paid. It will result in shorter drill life, more burring, tapered or funnel-shaped holes or increasing inability to duplicate hole size to close tolerances. If any rules should be kept in mind regarding speeds and feeds in the use of small and microscopic drills, it should be this: As the drill decreases in diameter below 0.020 in. the rpm should be decreased rather than increased and the infeed per revolution of the drill should be compatible with the ability of the drill to withstand the torque. The operator should bear in mind that as the diameter of the drill is decreased one half, the area is four times less and consequently, the torque resistance is considerably less.

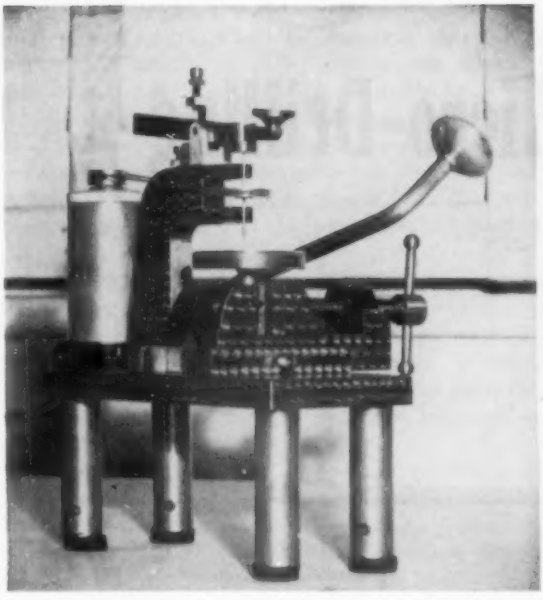
Speeds and Feeds

It is axiomatic that in true drilling the drill must remove stock on each revolution. The amount of stock removed per revolution will be determined by the infeed of the drill. Let us say that the maximum infeed of the drill will be determined by the ability of the drill due to its size to withstand the torque or the reverse stress placed upon it as influenced, of course, by the rake angle back of the cutting edges and the rpm. Every material has an inherent resistance to abrasion or cutting and the rpm of the drill must be kept well within these resistance limits in order to observe good drilling practice. From practical experience, we have found that this means comparatively slow drilling speeds.

If a drill is 0.006 in. in diameter and is employed to drill through approximately 0.035 to 0.040 in. of steel (stainless, alloy tool steel or cold rolled) at speeds from 10,000 to 100,000 rpm which we have found to be wide-spread practice, the drill—if it removed stock for each revolution at these very high speeds—would drill the hole completely through in a second, more or less. This, we know from experience, is not possible and since we know that such holes can be drilled satisfactorily in approximately ten seconds, we therefore conclude that when an excessive rpm is employed, the drill is gliding over the work surface, abrading the cutting edge of the drill and at the same time work-hardening the surface through which it must drill.

The Micro-Drill

In the matter of the flexible drill, we have found that the hardest and the shortest drill blade is the best for accurate production drilling. The reason for the universal acceptance of the drill which is somewhat flexible is that it will, to some extent, compensate for inaccurate chucking devices, sloppy spindles, excessive vibration, and lack of good operator-control of the drill, due to basically improper design of



(Left) bench model drilling machine employing vee-block principle and simple leverage mechanism. (Right) Multiple spindle watch balance wheel drilling machine used for high precision micro-drilling. This also employs the vee-block principle.

spindle depressing mechanisms. The art of drilling is in the controlling or restricting of the work which the drill is permitted to do. This also means the controlling of the reverse stress to which the drill is subjected.

How the Drill Is Made

Most truly micro-drilling today is done with oversize shank drills, although the drill points or blades may be of the spiral type as these are generally available. Since this type of small and microscopic drill must rotate true—at least within the limits of the back taper of the blade—eccentric rotation which may be caused by conventional chucks results in abuse to the drill. In recent years, improvements have been made in the nature of adjustable chucks, such as the ball chuck, which permits the truing of the drill by engaging it (while running) with the fingernail or some other object and then locking the chuck in position. This has been a worthwhile advantage, although it can be appreciated that if the drill point is still not concentric with the shank, the employment of the shank as a truing medium can only be a relative improvement.

This eccentricity of operation has also been overcome by the V-block principle which makes possible the grinding of opposed flats on the drills to uniform depth and the accurate and uniform generation of point and rake angles.

Drill uniformity is of the utmost importance since drills which do not turn in a concentric fashion are rapidly fatigued and rapidly broken. Flats or webs which are off-center will drill oversize holes. Point angles which are not uniform will cause drills to cut only on one lip. They will unduly strain the drill and will cause the drill to cut oversize and other than uniform holes even to the extent of their being egg-shaped. Lack of uniformity in the rake angles of the drill will permit undue reverse stress to be placed upon it, particularly if used in drilling equipment employing the rack and pinion principle. These factors apply to drills regardless of their hardness properties; however, from a breakage standpoint, the hard drill is most seriously affected. Specific factors which influence the size and quality of the hole to be drilled as well as drill life, are: (1) back taper or clearance on the drill blade; (2) point angle; (3) rake or clearance angle back of the drill point; (4) web thickness and drilling pressure as influenced by web thickness.

Controlling Hole Size and Quality

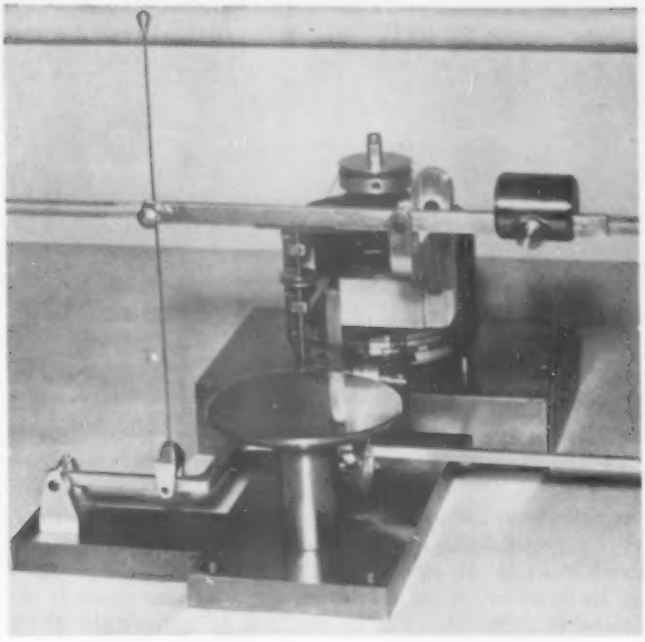
Drill diameter is only one factor governing hole size. The drill must be checked absolutely true, preferably under a 20 power binocular and in chucking true care must be taken that the drill is very tightly chucked so that under drilling pressure it will not have a tendency to flex in the collet. Since any tool is as strong as its weakest point, back taper or clearance on the drill blade should be held to very close tolerances.

Web thickness determines hole size by governing pressure necessary to make the drill cut. If we will look directly at the cutting end of a pivot or spade-type drill, we will see a line across the end of the drill which has no cutting ability whatsoever. The minimum length of this line will be determined by minimum web thickness required to give the drill necessary strength. The thicker the web, the longer the line becomes and the pressure necessary to make the drill cut. The more pressure used in drilling, the larger the hole will be in relation to the diameter of the drill.

The line visible on the end of the drill has no *cutting ability*, as has been said, and increased rake angle causing the line to become lengthened and angular in relation to the flats has simply the *effect* of increasing the initial web thickness without introducing some of the other undesirable results of too thick a web. The point angle helps to determine hole size since the longer the point angle, the more centering effect is created for the drill. The blunter the point angle, the greater care and skill must be exercised on the part of the operator in order to control hole size as could be determined by point angle. Since with the blunt point angle there is not the exaggerated centering effect available with the longer point angle, we can assume that in production less accurate holes will result. On the other hand, with the longer point angle, the drill will be subjected to much greater reverse stress and the effective life of the drill will be reduced.

Since drilling pressure in itself will help to determine hole size, one of the important factors to consider therefore is that the operator develop a sensitive touch to the point that he can duplicate drilling technique and drilling pressure over thousands of holes. Sustained cutting pressure should be employed at all times when drilling metal which has a

Top view of multiple spindle balance wheel drilling machine.



Bench model drilling machine having vee-block principle.

tendency to work-harden or glaze, and care should be taken that the drill is never allowed to dwell in the metal without being progressively fed. At the same time, it must be remembered that you cannot create an undue amount of torque on the tiny drill and reciprocation of the drill must be constantly exercised.

Stock Removal

Since the tendency of the drill is to act like a screw, when it is permitted to bury its cutting edges in the metal, it wants to pull itself down into the metal, bind and break off. This fact serves to impress us with the necessity for controlling the amount of metal which the drill is permitted to remove at any one time. It should also be remembered that sustained torque is injurious to a drill even though it may appear to be holding its cutting edge and not twisting under the continued drilling of a few dozen holes. If the proper amount of stock is removed per reciprocation of the drill and the proper drilling pressure is used, thousands of holes may be drilled without damage to the drill. Occasionally, through bad annealing of the stock, hard spots will appear in the metal which have not been caused by cold work-hardening. They represent a condition which must be overcome purely by drilling technique and in such a fashion as to abuse the drill as little as possible. In breaking through such hard spots which may be no thicker than 0.001 or 0.002 in. the operator should sharply peck at the exposed surface of the metal with the drill in order to cause the drill periodically to act as a trip hammer. Thus the shock will help to break the surface and permit the cutting edge to take a bite without abrading that cutting edge.

Use of Coolants

Hole size and wall finish will be determined not only by the tool itself and the technique with which the operator uses it but by the quality of the cutting compounds or oils used in drilling. The life of the tool will also be greatly affected by the use of coolant or the lack of it. For general work, any light base cutting oil is recommended for this small drilling. Carbon tetra-chloride, of course, is the most efficient but has other drawbacks which render it undesirable. Cutting compounds, drilling pressure, and web thickness combine to help determine wall-finish and to create conditions known as galling or on the other hand, burnishing of the walls of the hole. This is especially true of the pivot drill. Since the cutting edges of the drill are never entirely exposed, the round sections of the drill at the cutting end, opposite the flats, presents to the wall of the hole being drilled a burnishing area and if the web thickness be too thick, a galling area. This burnishing ability of the pivot drill explains its tendency to produce the most accurate and smooth-walled holes of any known drill, especially in the small and microscopic diameters.

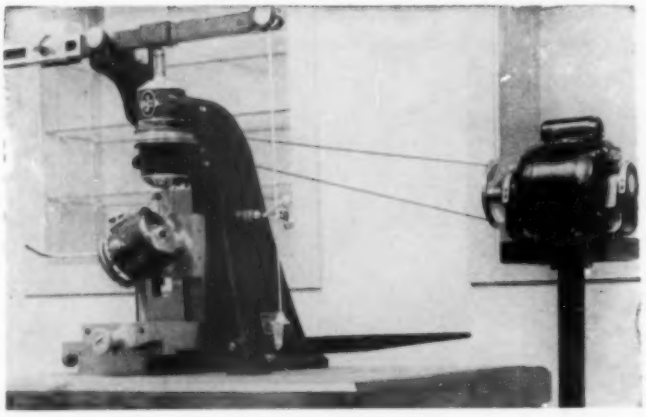
New Drilling Equipment

One of the requisites in micro-drilling is the need to control perfectly the infeed of the drill and the relieving of the drill from engagement with the work-piece.

With the rack and pinion feed, there is an interval between the time when the drill is being actively fed into the workpiece and the time when it is retracted or removed from the work surface during which the drill can do exactly as it pleases, namely, act like a screw, using up the excess play supplied by the rack and pinion. Such a machine principle, while very practical in conventional-size drilling, is not conducive either to long drill life or good hole quality.

The problems of high frequency and vibration are, in addition, sometimes overlooked in micro-drilling. Vibration is one of the greatest hazards to small and microscopic drills since it not only acts as a trip hammer—in effect pounding the cutting edges off the drills—but it robs the operator of the very necessary sensitive touch which is necessary for successful and accurate micro-drilling.

There are two further points which should be considered. First, if the drill is so small that the operator cannot adequately see its action or the nature of the cuttings, and the leverage ratio and sensitivity are such that he cannot adequately feel the action of the drill, and the touch is further complicated by the presence of vibration, he is trusting entirely to luck in the accomplishment of his drilling goal. Second, if adequate optical aids are provided and the vibration still remains present and the leverage ratio and sensitivity are not increased in direct proportion to the visual



Drilling machine setup showing index head set for drilling diesel fuel nozzles.

magnification, the operator will be subjected to an exaggerated nervous strain whether his production requirements be much or little. If, for example, in drilling with a drill 0.006 in. in diameter, direct spindle pressure of one ounce is required to cause the drill to cut and an optical aid of 20 magnifications is employed, a spindle-actuating leverage principle should be employed, lessening the required finger pressure to approximately 1/20 of one ounce and providing a spindle travel of approximately 0.001 in. for every 0.020 in. of lever or finger travel. Thus, the operator will be working in a normal world as relates to sight and touch; and barring the presence of excessive vibration, should be able to determine by the nature of the cuttings, the quality of the cutting edges on the drill, as well as the condition of the material which he is drilling. For example, if the cutting lips of the drill are uniform and the material being drilled is properly annealed, the drill should be able to produce two spiral cuttings at the same time, one from each cutting lip. The operator will be able to tell from drilling pressure required to make the drill cut whether or not the drill is sharp. If he should run into progressively harder metal in the work piece, the cuttings will begin to take the form of ships and in the case of hard spots, the swarf or cuttings will assume the appearance of black powder.

The V-Block

One approach to micro-drill control has been the V-block which, instead of employing bearings, has two opposed vees made of wear-resistant synthetic material. The drill shank which has been ground and lapped round and straight after heat treating or hardening has had a drill point ground upon one end absolutely concentric with the shank. A small pulley is fitted on this drill shank and the drill shank is laid into the vees, becoming its own spindle. A belt made of four-pound fishing tackle, approximately 0.0100 in. in diameter, is placed over the pulley and also engages the pulley of a remote low-speed, balanced, vibration-dampened motor. The pull of the belt holds the drill solidly in the vees so that it has line contact at all times with the vees. The equivalent of spindle and bearing tolerance is absolute zero, and as wear might conceivably occur in time, this tolerance will still remain zero until such time as the wear points are entirely worn out. The upward pull of the belt retracts the top beveled end of the drill shank up against the depressing arm. Thus the drill has been made concentric and must now operate in a similar concentric fashion in a drilling machine because it is being used exactly the same way it was made.

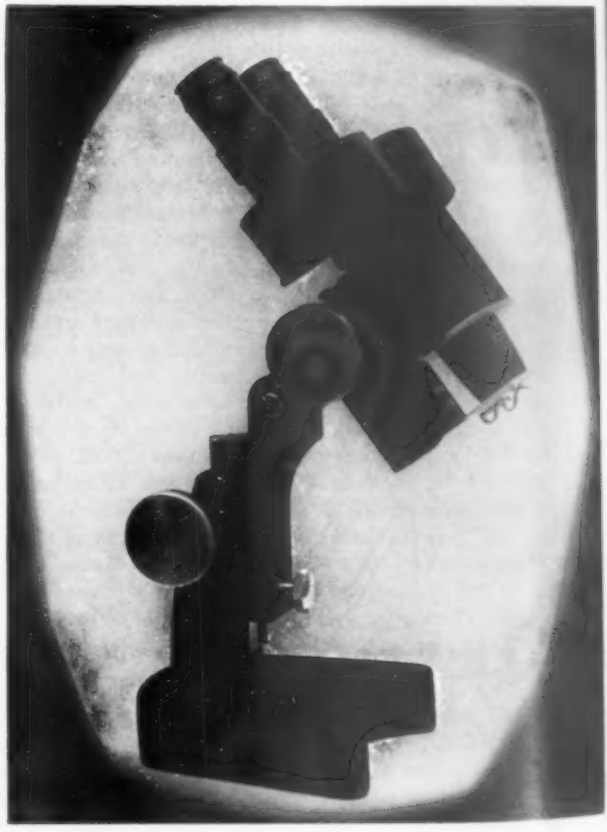
The Future of Micro-Drilling

Micro-drilling, and especially precision micro-drilling, is becoming of increasing importance in that it is possible to drill so accurately that secondary operations are frequently not necessary. Elimination of secondary operations such as reaming constitutes a real and important saving in the industries where literally millions of holes are drilled monthly and yearly, such as the diesel engine industry. The small multiple holes in the fuel nozzle are the heart of the diesel engine, and therefore a vital part of our everyday lives. The microscopic precision hole is important in the synthetic silk and yarn industry, particularly in the spinnerettes which employ multiple holes in the nature of 0.0015 to 0.0020 in. diameter in precious metals and stainless steel for the extrusion of synthetic silk and yarn filaments.

The watch and instrument industry depends largely for its existence on the small hole, and must increasingly in the future, to compete with the less expensive foreign labor such as that incorporated in the fine Swiss watches, which are imported in such plentiful quantities.

In the medical instrument industry, there is the so-called hypo-spray which employs the use of a small precision hole in a device which injects medication hypodermically. If the hypo-spray, as one of the first major applications of small precision holes in the medical field, should, as I anticipate, successfully pass its clinical tests, it will mean the production of millions of precision holes per day.

Generally speaking, as our mechanical age grows and refines itself, we find our instruments and our gadgets becoming smaller, more refined and more complex. We find the weight factor in aircraft all important. This means that many instruments must be kept as light as possible. Micro-machining and micro-drilling make possible the use of micro-parts in these intricate instruments.



Stereoscopic shop binocular microscope used in conjunction with micro-drilling equipment.

Drilling Small Parts

By Arthur F. Hird

ENGINEERING DEPARTMENT SUPERVISOR
HARRINGTON & RICHARDSON ARMS CO.

Some of the greatest problems in drilling are, seemingly, not those things with which we are unfamiliar, but those which have been forgotten or overlooked. A recent example:

The trial run, which consisted of fifty components, was to prove the set-up for future production. The set-up man was using a twenty-pound pump-type jig. Procedure was to load the workpiece, drill one hole, remove the drill bushing and replace with a reaming bushing. The jig was then reamed.

Since this operation was needlessly long and also abused the drill and reamer because of inadequate alignment, the set-up shown in Fig. 1 was adopted. In addition to the guide rail shown here, another method is available, using a "quad-head", with the drill jig aligned under the spindle and clamped to the drill press table. Incidentally, a tap and tapping-head set-up will require even less effort than other tools to compensate for any misalignment.

Clamping the drill jig to the drill press table saved, in addition to tool savings, as high as forty percent operating time. Spacing of holes (two should suffice) about eight inches further apart than the length of the normal drill jig base will cover most set-ups with the use of various lengths of hold-down clamps.

In some instances, where tolerances are liberal, a back rail and stop or a clamped jig is often used without the necessity of bushing plate or bushing. If desirable to go further in the use of a guide rail and stop, it would take little thought to make it adjustable.

The procedure involves drilling a clearance between the workpiece and the bottom of the bushing which approximates one and one-half times the diameter of the drill to be used. If conditions will not warrant such a diameter, drilling problems are increased. A fast spiral drill will be a help in this case in getting the chips up and away from the work before they have a chance to accumulate.

If drilling is confined, it usually follows that no clearance at all is better than too little. Insufficient clearance often will cause the drill cuttings to wind themselves into a small ball or closed spiral which makes it highly difficult to drill further. Burrs, too, can be a source of trouble if there is not sufficient clearance to permit removal.

By the way of review, the following points should be considered:

1. Use the recommended drill for material in process, ground correctly and kept that way.
2. Use recommended speeds and feeds for size of drill and material being drilled. Don't overlook the coolant.
3. Clamp jig or otherwise ensure steadiness, with bushing and spindle accurately aligned.
4. Clamp component firmly and quickly against locating faces limited in area, from which chips are readily washed away.
5. Design drill jig so as not to confine workpiece if possible; if this is not possible make provision for burrs.

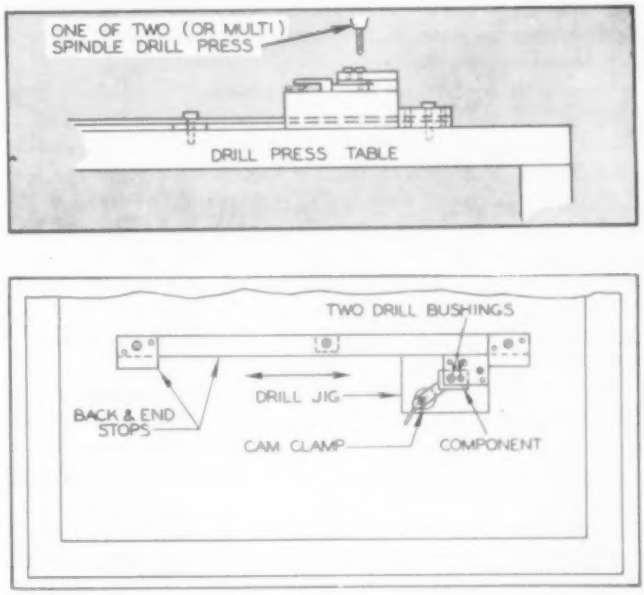


Fig. 1. Above is shown quick positioning for two (or more) spindle drill press operation. For drilling two or more holes, slide jig to new position. If drilling in wood or metal where tolerance is liberal, no drill plate or bushings would be required.

Hot Spot Machining

By Sam Tour
SAM TOUR & CO., INC.

PART I

Concluding a two-part report on the development and current status of machining at elevated temperatures

In the measurement of tool loads, five SR-4 strain gages were used, mounted on the tool shank with the tool post providing the equivalent of a support for a cantilever beam. Fig. 9 shows this arrangement, illustrating the relative positions of the gages as well as the wiring. Four gages were mounted on the four sides of the tool holder. The fifth was mounted on the left side, vertically to the shank, as a dummy gage to permit automatic temperature compensation.

By using this tool dynamometer, it was possible to measure both the horizontal and the tangential components of the load upon the tool during machining at room temperature and at various elevated temperatures. From these horizontal and tangential components of loads, it was possible to calculate total pressures on the tip of the tool. With the data as to depth or width of cut and feed per revolution, it was possible to calculate unit pressures in pounds per square inch on tool tips.

Variations in tool loads with variations in surface temperatures of the work provide a ready means for application of automatic control of heat input ahead of the cutting tool. For a given speed, feed and depth of cut, if the tool load increases, more heat input is required; whereas if the tool load decreases, less heat input is required. Variations in tool loads or tool post stresses as picked up by a tool dynamometer can be used with an automatic controller to vary the power input from the high frequency source and maintain a constant temperature of the work ahead of the tool.

Figs. 10 and 11 are curves derived from hot machining tests on a medium carbon steel (Navy grade "M" in Table I), showing the relationship between surface temperatures of the work and tangential and longitudinal loads. Heating was with oxy-acetylene.

From data of the nature as shown in Figs. 10 and 11, it is possible to calculate the resultant tool tip chip pressure in psi. This has been done for low carbon steel, medium carbon steel and Navy Grade "AN" steel. The results are shown in Figs. 12, 13, and 14 respectively. For these steels, as well as for the Grade "V" nickel steel and for the high alloy material called S-816 and for other steels such as stainless steel which have been hot spot machined, it has been found that the cutting pressure in psi on the tool tip is reduced by hot spot machining. As shown in Fig. 12 for low carbon steel, the heating of the work to 1100 to 1500 deg F surface temperature has decreased the cutting pressure to below 300,000 psi. This figure shows that, both at room temperature and at elevated temperatures, the actual tool pressures decrease as the cross-sectional area of the chip being formed increases. For the medium carbon steel shown in Fig. 13, it is evident that considerable advantage is obtained when the surface temperatures of the steel is heated to 500 or 600 deg F. The improvement continues as temperatures at the surface are increased to 1500 or 1600 deg F.

Chip Is Continuous Ribbon

When hot spot machining at surface temperatures of 1100 deg F to 1500 deg F on ordinary steels, the chip is removed as a continuous red hot ribbon. For production work, it will be necessary to develop methods of handling this hot chip as it comes from the work. It is believed that

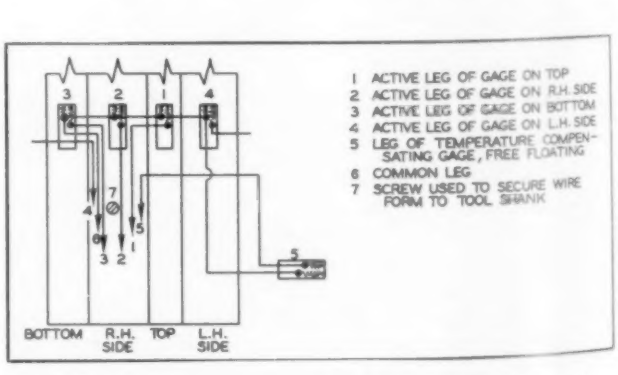
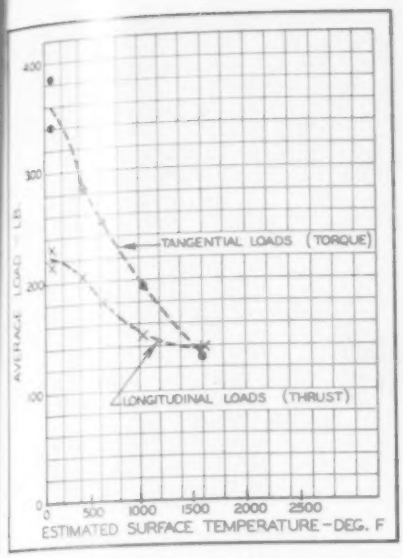
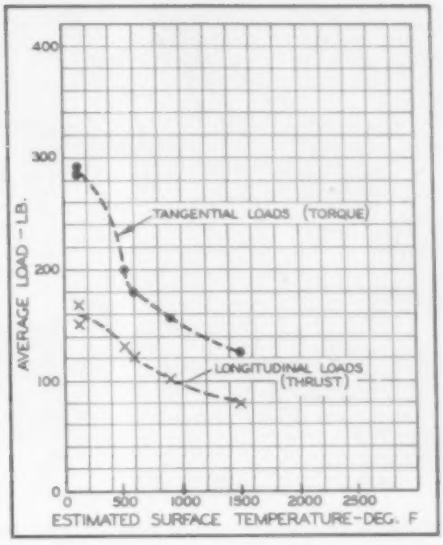

1 ACTIVE LEG OF GAGE ON TOP
2 ACTIVE LEG OF GAGE ON R.H. SIDE
3 ACTIVE LEG OF GAGE ON BOTTOM
4 ACTIVE LEG OF GAGE ON L.H. SIDE
5 LEG OF TEMPERATURE COMPENSATING GAGE, FREE FLOATING
6 COMMON LEG
7 SCREW USED TO SECURE WIRE FORM TO TOOL SHANK
BOTTOM
R.H. SIDE
TOP
L.H. SIDE

Fig. 9. Set-up for measurement of tool loads in milling. Four strain gages were mounted on four sides of the tool holder; the fifth was a dummy gage.





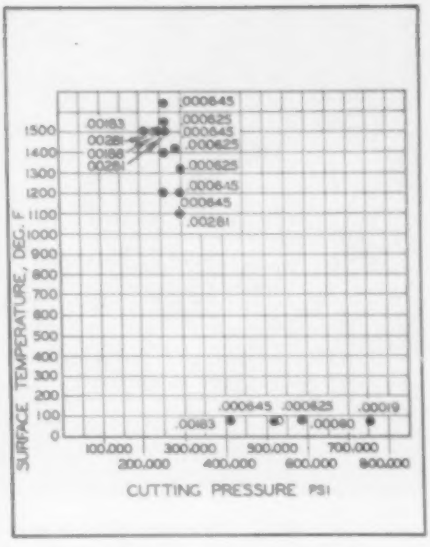


Fig. 10 (left) shows plotting of tool loads versus surface temperature for medium carbon steel. Job was run at 73 rpm, with 0.015 in. feed, 0.0623 in. depth of cut at 55.5 spfm. Fig. 11 (center). Tool loads versus surface temperature on extended tests. This was run at 73 rpm, with 0.010 in feed, 0.0625 in. depth of cut at 54 sfpm. Fig. 12 (right) shows cutting pressure versus surface temperature when hot spot machining low carbon steel. Figures indicate cross sectional area of chip.

this problem can be solved by fairly simple mechanical means. One proposal is to use a tension reel and wind the chip as a continuous ribbon onto a reel. Another proposal is to use a guide tube to guide the chip to the edge of the carriage where a power chopper can chop the chips into short lengths and allow those lengths to drop into a suitable receiver.

Fig. 15 is a close-up view showing the high-frequency induction pancake coil, the cutting tool in operation, the continuous ribbon or chip being removed and the use of coolant on the shank rather than on the tip of the tool. It will be noted that coolant is used also on the center in the tail stock shown in this illustration. The armored cable leads from the dynamometer strain gages on the tool is shown in this Fig. 15.

Fig. 1 is a close-up view of the tool itself as mounted in the tool post. This shows the carbide insert in the end of the tool holder, the metal jacket protecting the SR-4 strain gages forming the tool dynamometer on the tool shank and the lead wires or lead cable of this dynamometer to the indicating instrument.

Outstanding in results were the machining rates established for alloy S-816, Allegheny-Ludlum Steel Corp.'s high cobalt-low iron, high temperature alloy. Recommendations as to machining, developed by the National Advisory Committee for Aeronautics, were that the optimum metal removal rate, considering part finish, tool life, and other commonly associated factors, should be in the neighborhood of 2.1 cu in. per hr. At 1500 deg F, the volume of metal turned on a 5 hp lathe was 4.5 cu in. per min. with no noticeable tool wear during the tests, excellent finish, reduced power requirements, and lower tool loadings. In other words, instead of a metal removal rate of 2.1 cu in. per hr, heating to 1500 deg F permitted a metal removal rate of 270 cu in.

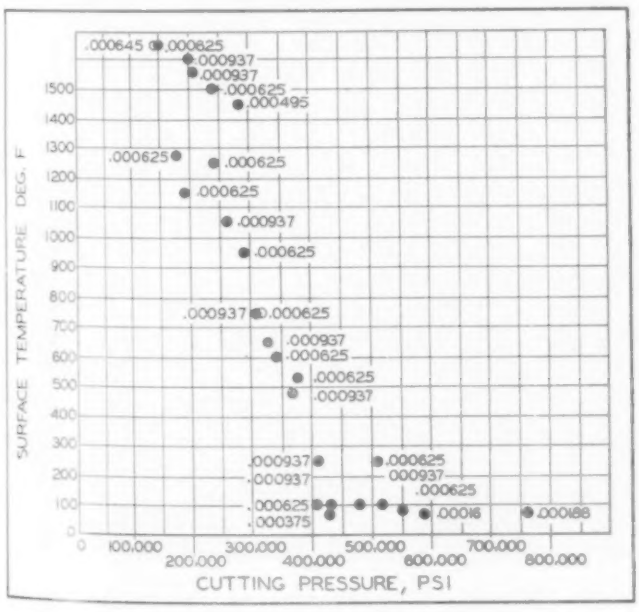


Fig. 13. Cutting pressure versus surface temperature when hot spot machining medium carbon steel.

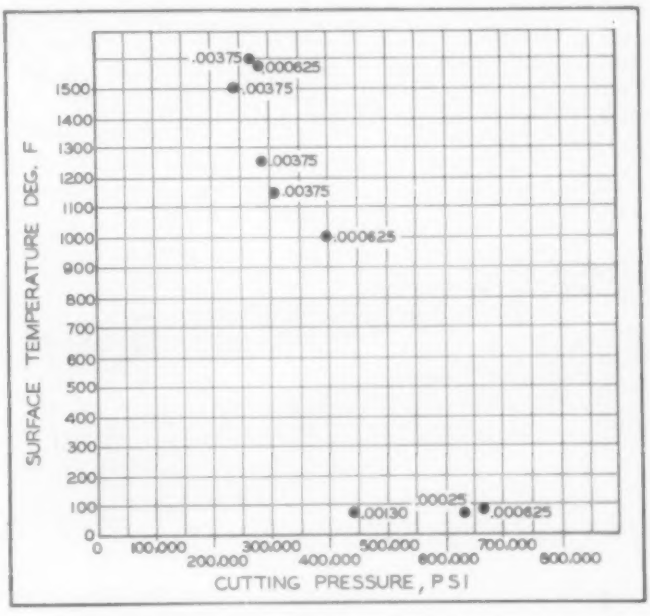
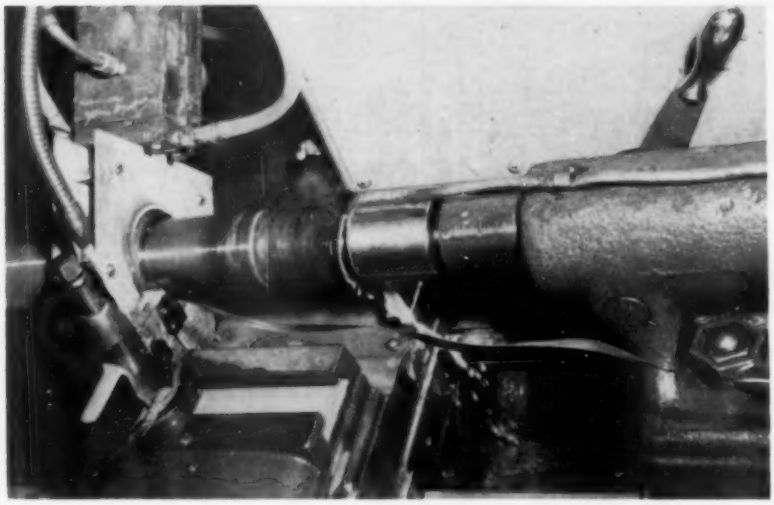


Fig. 14. Plotting of cutting pressure versus surface temperature of hot spot machining of grade "AN" steel.



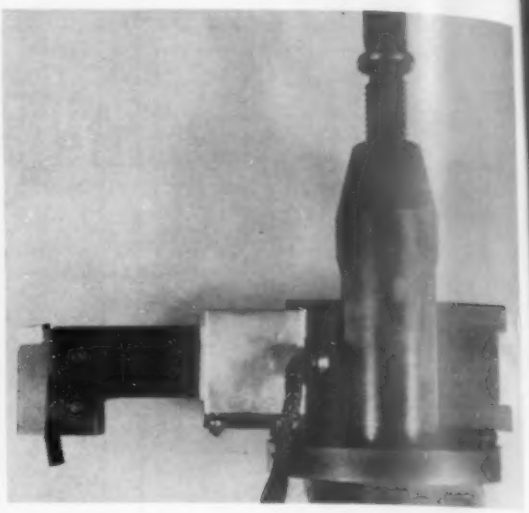


Fig. 15 (left). Close-up of hot spot machining showing relation of the pancake coil to the tool bit and the continuous type of chip produced. Fig. 16 (right) shows an insert-type carbide tool used in hot spot machining. The SR-4 gages used for determining horizontal and tangential components of the load are housed under the metal shield.

per hr, an increase large enough to encourage the investment in required apparatus for heating the metal during machining.

Fig. 17 shows the depth of cut and chips resulting from hot machining of S-816 with the flux concentrator as the heat source. Tool condition was good after hot cutting more than 13 cu in. of S-816.

The chip resulting from hot cutting of steel is a continuous strip, except in the case of the S-816 high temperature alloy, where the chips were relatively short. A comparison of the chips resulting from cold and hot cutting is shown in Fig. 18. The upper curled and ragged chips are those from cold cutting. The lower continuous band is from hot cutting.

In substantially all of the lathe work to date a carbide insert type of tool holder has been used. As a typical example, for the S-816 alloy, a Super Tool Co. square insert-type, right hand turning tool was used, set at the following angles: Back rake, —9 deg; side rake, —9 deg; end relief, 9 deg; side relief, 9 deg; end cutting edge, 5 deg; side cutting edge, 5 deg; and nose radius $\frac{1}{16}$ in.

Throughout the work there was no difficulty caused by tool wear or breakage of the carbide inserts during hot cutting, and chatter was absent.

The hot turned surfaces of all the test pieces had finishes noticeably superior to surfaces cold turned under the same cutting conditions. Small transverse tears in the surface of steel as cold cut are entirely absent in surfaces as cut hot. Faxfilm and Brush Surface Analizer explorations show the great improvement in surface finish obtainable by hot spot machining.

Work has been concentrated on proving the feasibility of hot machining rather than in developing techniques or applications. Nothing has been done in an investigative way about tool design. Much of the machining was done with the square insert type tool, but there is no assurance that this is the best design. There are also the various other types of machine tools on which hot machining can be performed, but about which little or nothing has been done. Another phase is the application of a heat treating operation by using the coil for reheating, after cutting, and then quenching. These and many more facets of this new machining technique have to be investigated. The results to date indicate that hot machining will be a vital contribution to machining methods and knowledge.

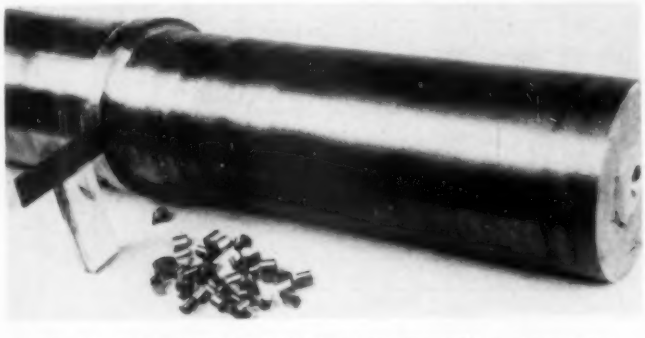


Fig. 17. In hot turning S-816 alloy, finish was good as shown here, and chips broke into $\frac{1}{2}$ to $2\frac{1}{2}$ in. coils. Metal removal rates were about 270 cu in. per hr as against 2.1 cu in. per hr recommended for cold turning with high speed steel tools.

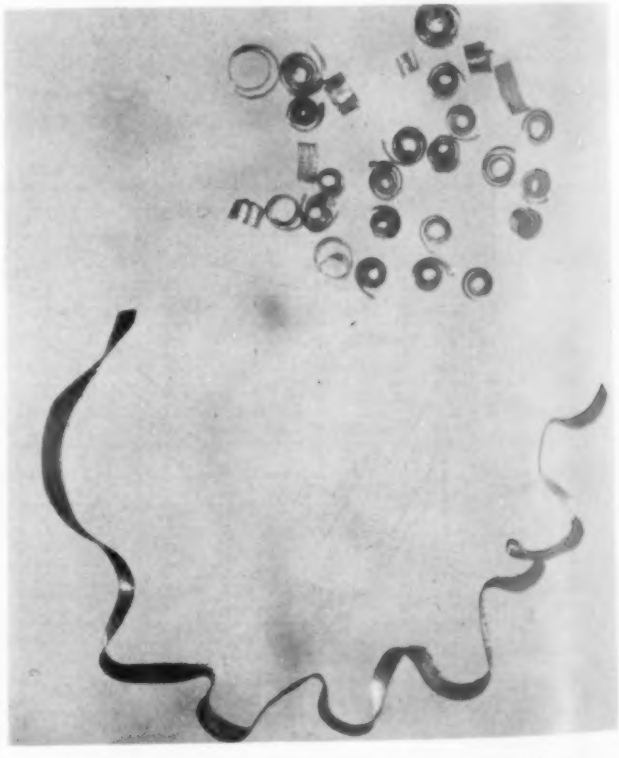


Fig. 18. Above is an interesting comparison of chips resulting from hot and cold cutting. Curled and ragged chips at top are from cold cutting operation; continuous band at bottom resulted from hot cutting.

Statistics Can Change

A Job Classification

By William A. MacCrehan, Jr.

PROFESSOR

NEW YORK UNIVERSITY COLLEGE OF ENGINEERING

TRADITIONALLY, THE PRESTIGE of the inspection department has varied widely in the industrial organization. Three basic factors contribute to the conditions that create this fluctuation:

a. There exists the condition where the demand for the product produced is so great that sustained sales continue in spite of product quality variation.

b. The condition where a curtailment in the sales of the product forces an economic cut in the employed personnel, and invariably this is reflected in a major cut in inspection personnel.

c. A periodic condition crops up after each war where the manufacturer converts from the rigidity of government specifications to commercial specifications, thus minimizing the functional requirement of the inspection procedure.

Let us examine each case briefly so that we understand the functional position of the inspector with relation to the organizational chart found in the majority of industrial plants.

Whether inspection reports to production or to engineering, the primary status of the chief inspector has not been on a par with the heads of the other various executive branches of the organization. To understand this, we must look back on the caliber of the traditional chief inspector.

Some men entered the field of inspection with a goal in mind. However, the role of chief inspector was not an end of the road position, but served as a stepping stone to more important positions above the classification of chief inspector. Why did many technically trained men feel that the ultimate position of chief inspector was not worthy of being a final goal? The best answer to this is advanced by examining the usual qualifications required for an inspector. He must:

1. Adequately read and operate a measuring tool
2. Understand the technicalities of specs and blueprints
3. Be familiar with the manufacturing process

The initial step does not require an understanding of the staff knowledge of plant operation, but rather that of the line operation of a plant. This was a deterrent to technically trained young men. Men who availed themselves of out-of-plant schooling, or were selected by plant management to be enrolled in foremen training programs, raised themselves to a point where staff responsibilities rested on their shoulders with assurance. There was still an undercurrent of personnel who carried out the routine functions of inspection in a manner that allowed inspection to be classified as:

a. A production check station on the work route of manufacturing.

b. A department of sorters that kept production rolling through a culling operation.

Consumer Attitude on Quality

Quality consciousness on the part of the consumer is evidenced by the rebellion of the general public in refusing to purchase shoddy products hastily produced to meet the pent-up demands of the war-deprived public. The public bought many of these products with an acceptance standard based on an inspected quality level established over many years: their irritation at finding a lower quality standard increased in geometric proportion to the actual cases encountered.

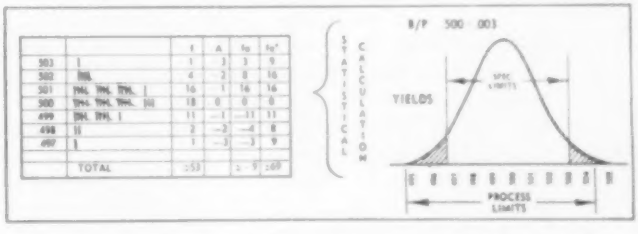


Fig. 1. Pre-production planning can be done with the aid of the chart above, which compares the needed accuracy of production with the actual capabilities of the machines in use.

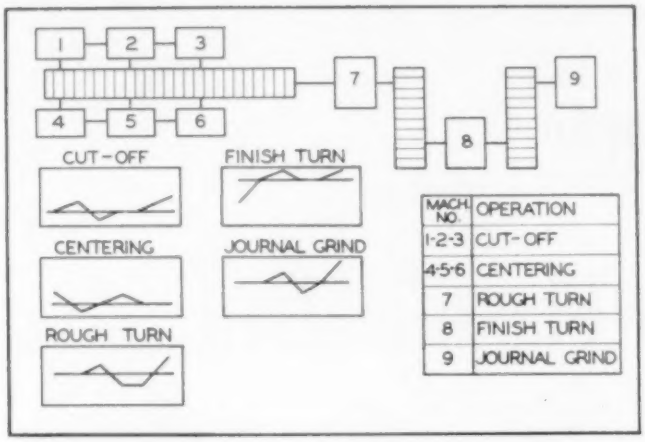


Fig. 2. Better arrangement of inspection facilities and better control of defective parts can be obtained by plotting operations as above, with percentage of defects noted for each department.

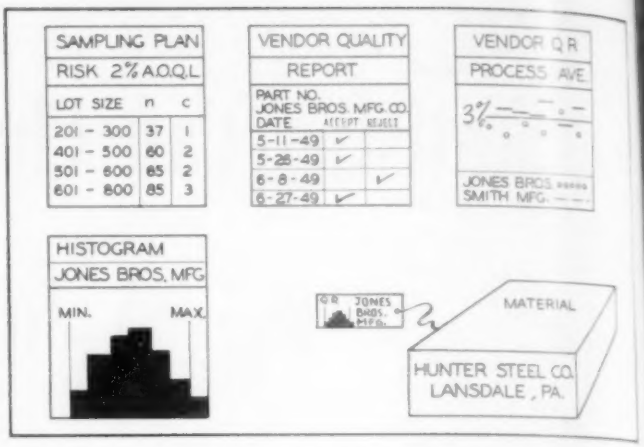


Fig. 3. An important step in quality control is a continuous check on quality and percentage of defects in vendors' shipments. Continuous records of vendors' performance can be handled as shown.

Organizing a Successful Department

The place of the inspection department in the family of administrative organization, to successfully produce a soundly manufactured product, requires a new write-up for the job classification of inspection supervision. This classification has a six-point program:

1. It calls for a man trained in the principles of good management, either through a company-sponsored foremen training program, or as a graduate of a reputable school of business administration or engineering.
2. It requires a man who possesses capabilities for exercising executive mandates on the same plane as the executives in corresponding departments.
3. It takes a man who is trained in the technique of applying and guiding a program of statistical approach to inspection problems.
4. It calls for a man who possesses the character and foresight needed to apply a comparison between the product of his company and the product of his competitors —this, for the purpose of establishing a quality standard that will be impervious to the various political factions in the plant organization.
5. It requires a man who considers the position of chief inspector a goal worthy of continued efforts to improve the services of the inspection department to the management organization.
6. It takes a man capable of judging the original specifications established for the product against the ability of the plant to produce the product to the required specifications.

Applying the Statistical Approach

There is a new slant here—it involves application of the statistical approach to inspection problems. Let us make a study of a typical manufacturer's problem. We will review the assistance that the chief inspector can provide if his forces are statistically minded. The problem under consideration is the one concerning the manufacture of a ⅓ hp motor armature shaft. It is best to study the situation, piece by piece:

a. **Specifications:** A review of the blueprint to judge the needs of the functional surfaces. Here, statistics pack a real wallop, for by utilization of the Machine Operational Accuracy Chart, a comparison between the blueprint requirements and the machine capabilities may be made. Where the spread of the machine is greater than that of the allowable variation on the blueprint, compromises may be made (special tooling, change of raw stock material, training of the operators, etc.). The potential losses on the product are checked before a single production piece is turned. See Fig. 1.

b. **Factory Layout:** Knowledge of the areas where the greatest variation in product quality occurs through application of statistical Percent Defective Charts will enable the inspection supervisor to locate his inspection stations at the most advantageous position to prevent the flow of a defective part through more than one operation before detection. See Fig. 2.

c. **Raw Material:** Through incoming inspection reports, via single, double, and sequential sampling procedures, the quality level of the raw stock can be established quickly. Different vendors can be made aware of the fact that a competitive check is being made to ascertain their conformance to purchasing specifications. Through the use of Histograms and a tag labeled Quality Report, a simple understanding may be passed along to the supplier to assist in a common inspection procedure, Fig. 3.

d. **Gages and Gaging Methods:** Statistical calculation of the variables that create inaccuracies through gage wear can rapidly render a decision on the merits of chrome plating vs. carbide gaging surfaces, attribute hand measurements vs. variable electronic equipment. These are savings that are tangible at the outset, not late in the game as a move born by painful experience. See Fig. 4.

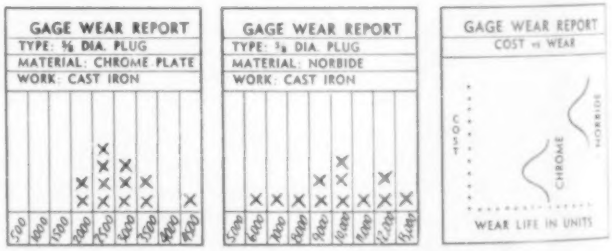


Fig. 4. Comparative charts such as shown above are useful in contrasting performance with product or process cost.

SPOT WELD "TEAR TEST" DATA			
SETTING	SPEC. 1	SETTING	SPEC. 3
23	25	25	28
26	27	29	25
21	24	26	32
24	23	31	29
23	24	28	27
25	27	27	28
23	25	29	30

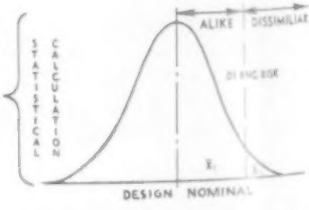


Fig. 5. To keep a proper record of changes or results of changes in process, the divergence set-up above is an asset.

TRADITIONAL

LOT "A" TANK NO. 1

TIME	TEMPERATURE 60°	70°	80°
10 MIN.	10 MIN.	10 MIN.	10 MIN.
20 MIN.	20 MIN.	20 MIN.	20 MIN.
30 MIN.	30 MIN.	30 MIN.	30 MIN.
40 MIN.	40 MIN.	40 MIN.	40 MIN.

MODERN

LOT "A-B-C-D"

TIME	TEMPERATURE 50°	60°	70°	80°
10 MIN.	TANK NO. 1	TANK NO. 2	TANK NO. 3	TANK NO. 4
20 MIN.	" NO. 4	" NO. 3	" NO. 2	" NO. 1
30 MIN.	" NO. 3	" NO. 4	" NO. 1	" NO. 2
40 MIN.	" NO. 2	" NO. 1	" NO. 4	" NO. 3

STATISTICAL

TIME	TEMPERATURE 50°	60°	70°	80°
10 MIN.	TANK NO. 1 LOT A	TANK NO. 2 LOT B	TANK NO. 3 LOT C	TANK NO. 4 LOT D
20 MIN.	NO. 4 B	NO. 3 A	NO. 2 D	NO. 1 C
30 MIN.	NO. 3 D	NO. 4 C	NO. 1 B	NO. 2 A
40 MIN.	NO. 2 C	NO. 1 D	NO. 4 A	NO. 3 B

Fig. 6. Arrangement of test results to provide maximum indication of results or trends with minimum experimentation.

c. **Actual Floor Production:** Three tools are available to ease the burden of knowing the quality of the production at any point in the process where losses justify investigation.

1. Average and Range Charts. Useful when tool wear occurs or where assignable causes enter the process.

2. Tests of Divergence. This technique plays a strong hand when new methods are being tried, or if operations are being altered and it is desirable to know if a significant alteration has occurred. See Fig. 5.

3. Analysis of Variance. Where the unexplained requires a series of investigations, time, money, and material can be conserved by the employment of this tool to randomize conditions in such a manner that the minimum number of experimentations may be run with maximum assurance of validity, as per Fig. 6.

f. **Final Inspection of Shafts:** The statistical ratio of agreed risk vs. lot size in a sampling procedure can give the inspection supervisor a proven method of guaranteeing the quality level of the product being shipped to the consumer. See Fig. 7.

g. **Customer Complaints:** Materials handling hazards or unforseen breakdowns are troublesome, but the inspection supervisor who is alert to the value of a P or P_n chart can be alerted well in advance through warnings indicated by the boundaries of chance and assignable variations. See Fig. 8.

The usefulness of statistics does not stop here—it can assist in absenteeism, or by correlation of breakage-to-hardness specifications (Fig. 9). The field of application is as fertile as the energy of the chief inspector who is hired as an integrated part of top management.

FINAL INSPECTION SAMPLING PLAN DODGE-ROMIG DOUBLE

AOQL 2% RISK

LOT SIZE	PROCESS AVERAGE .00-.04% TRIAL 1 N.	C.	TRIAL 2 N.	C.	.81-1.2% TRIAL 1 N.	C.	TRIAL 2 N.	C.	1.21-1.60% TRIAL 1 N.	C.	TRIAL 2 N.	C.	1.61-2.00% TRIAL 1 N.	C.	TRIAL 2 N.	C.
201-300	26	0	15	1	29	0	31	2	32	0	48	3	32	0	48	3
301-400	26	0	16	1	33	0	52	3	33	0	52	3	36	0	69	4
401-500	27	0	16	1	34	0	56	3	36	0	74	4	60	0	90	6
601-800	27	0	17	1	38	0	82	4	38	0	82	4	70	0	120	7

Fig. 7. Plotting of agreed risk against lot size provides the inspector with an accurate method of insuring a given quality level to the customer.

AREA M INSPECTION

DATE	TOTAL INSPECTED	NUMBER DEFECTIVE	% DEF	% DEF
3/9	1000	19	1.9	8
3/11	1000	23	2.3	7
3/11	1000	17	1.7	6
3/11	1000	42	4.2	5
3/14	1000	13	1.3	4
3/20	1000	18	1.8	3
3/20	1000	14	1.4	2
3/21	1000	29	2.9	1
				0

COMMENT: A HEAVY BURR AND OPERATOR WAS CAUTION ERE FOREMAN WAS NOTIFIED

UCL $\bar{P} + 3\sqrt{\frac{\bar{P}(1-\bar{P})}{N}}$

LCL $\bar{P} - 3\sqrt{\frac{\bar{P}(1-\bar{P})}{N}}$

CUSTOMER COMPLAINT ANALYSIS CHART

PRODUCTION	COMPLAINT	% DEF
535	5	9
621	9	1.4
625	4	6
580	7	8
598	11	1.8
631	8	1.2
590	19	3.2
632	12	1.3

TOTAL DEF. / TOTAL INSP. $\bar{P} = \frac{586}{101,500} = .57\%$

$3\sqrt{\bar{P}(1-\bar{P})} = 3\sqrt{(.0057)(1.00-.0057)}$

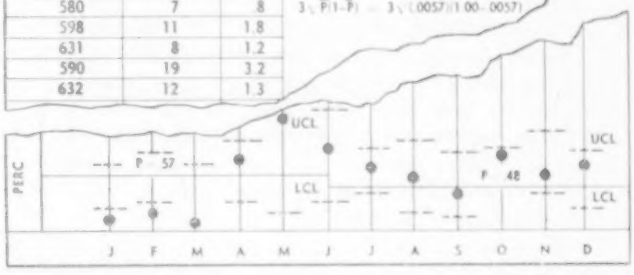


Fig. 8. Insurance against major customer complaints and prompt checking of those which do occur are provided by the two charts above. Departmental inspection results as shown in top chart provide a running record of defective production by area, and help the inspector to correct faulty production before further work is done. Analysis of customer complaints as shown in the bottom chart aids in localizing trouble.

HARDNESS vs BREAKING STRENGTH

ROCKWELL "C"	TORQUE WRENCH	PROCEDURE
62	140	LEAST SQUARES COR
65	153	INDEPENDENT VARIAB
63	151	ROCKWELL READING
62	151	DEPENDENT VARI
65	158	TORQUE WRENC
62	146	SET UP X A

TABLE OF NORMAL VARIATION 95%

ROCKWELL "C"	TORQUE WRENCH
60	139-143
60.5	140-144
61	140-147
61.5	140-149
62	140-153
62.5	142-157

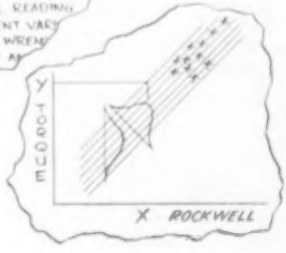


Fig. 9. Statistical plottings can be extended over a wide area of shop practice, as indicated by this correlation of Rockwell hardness versus breaking strength.

Use of Element Time Data for Effective Tool Design

By
N. M. Perris and H. K. Keever
PARTNERS
STEVENSON, JORDON & HARRISON, INC.

Part II

Consideration has been given in Part I of this paper to cases where modification of tools used has resulted in substantial labor savings in operation. Additional cases are cited below of the same type of change.

3. Turning Steel Tubes

Two examples are given: (See Fig. 7). Figure A shows the old method and Figure B the new method.

Under the old method (A) a 2 in. OD x 12 in. long x 1½ in. OD steel tube was turned concentric with the mill ID of the tube within 0.002 in., faced and chamfered on one end.

The following operations were required to accomplish this as follows:

1. Hand-center ID's of tube.
2. Place one end in soft-jaw chuck and support the other end with a revolving center.
3. Turn the piece half-way, face and chamfer the end.
4. Remove piece, turn and rechuck the turned end, supporting the other end with the revolving center.
5. Turn the other half of the piece, break corner. Remove from machine.

Under this method a line of demarcation was always visible where the turning operations met and the concentric tolerance was seldom obtained.

Referring to B, the new method involved the use of a split bushing arbor which would accommodate a large variation in the mill size ID of the tube. In this method, the tube was slipped over the arbor and the revolving center was forced against the end of the arbor to expand the bushing, at the same time, centering the piece and supporting the end of the arbor. The opposite end of the arbor is held in a regular chuck.

The piece is now turned complete and the ends faced and chamfered in one operation. The revolving center is then removed from the arbor releasing the split bushings and the piece is removed. *Concentricity is easily maintained* and the time to perform the operation is reduced by 63 percent. The time under the old method amounted to 5.29 minutes, while the time required for the new method is 1.96 minutes.

4. Grinding Arbor

At C in Fig. 8 is shown the type of grinding arbor used for finish plunge grinding bearing races. When using this arbor, the nut and washer had to be removed completely in order to place and remove the piece. The use of a "C" washer would not correct this condition because of the small size of the hole in the piece, which necessitated removing the nut anyway. It was impractical to reduce the size of the nut because of the center hole in the threaded end of the arbor.

The use of two arbors was also impractical as the grinding time was so short, and the tolerance close, and the grinding required the operator's attention at all times.

The modifications made for more effective use of this arbor, are shown at D. The arbor has been fitted with a knurled nut, the outside diameter of which is the same as the washer in C. The center section of the nut is counterbored so only several threads are left in engagement on the threads of the arbor. This change in design reduced the time for the entire operation by 15 percent. The old time was 0.80 minutes and the new time 0.68 minutes.

5. Bend and Emboss

In the original press setup with the stripper plate close to the die, the pieces were forced back into the die well while the punch was being withdrawn after the downstroke. This made it necessary for the operator to use a pick to remove the completed pieces from the die and resulted in a considerable delay in production.

Another design was developed with a longer punch and with the stripper plates placed in the sides of the die at a higher point. An air ejector made it possible to blow the pieces to a slide leading to the rear of the press, eliminating the need for hand picking the pieces from the die.

Element time values for both methods are given in Fig. 9, showing that the resulting savings from this modification in tools amounted to 46 percent.

6. Piece, Nick and Blank

In the original die set, the nicking punch was assembled with the blanking punch, and it was not possible to produce a satisfactory nick in the piece. In assembly, time was lost because of searching for the nick.

In the modified design, (Fig. 10) the nicking punch was arranged with the piercing punches. A deeper nick was put in the piece which practically eliminated the searching element by the assembler.

The nick is necessary during the assembly operation to line up the piece with pins on a component part. The time for the subsequent assembly operation was considerably less as shown on the sketch, resulting in a savings of 23 percent in time.

7. Face Two Bosses

This operation consisted of facing (2) bosses on a small cast bronze part (Fig. 11). When using the original tool, the operator had trouble lining up the pilot on the tool with the counterbored hole in the piece. Due to the short depth of the counterbore a short pilot had to be used.

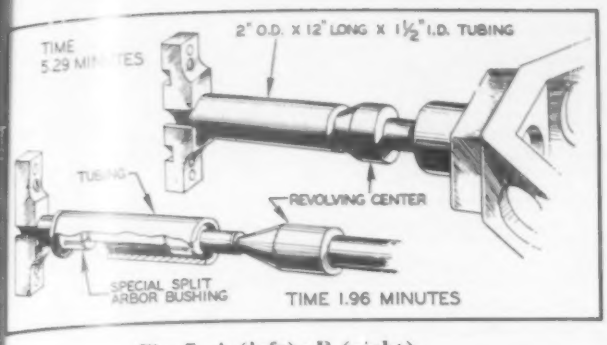


Fig. 7: A (left); B (right).

A longer pilot was put in the tool to locate from the tapped hole, and the operator had no trouble lining up the tool.

As shown on the sketch, the time required for this operation originally amounted to 0.157 minutes, and after the change, the operation took only 0.108 minutes to complete, resulting in a saving of time of 31.2 percent.

Where Modification in Design Resulted in Improved Cutting with Consequent Increase in Production

8. Change of Clamping Method

Due to the nature of the part, it was necessary to mount the piece on an angle plate fixture (Fig. 12). On the original design, clamping was accomplished by the use of a small clamping wheel projection, which made it necessary to use a smaller cutter and traverse around the periphery of the piece.

A shorter clamping nut and special wrench were designed so as to lower the clamping mechanism below the surface. This permitted the use of a larger face mill and milling was accomplished by one straight pass across the surface.

The feed used on the smaller cutter was 10 ipm. The feed used on the larger cutter was 38 ipm.

The saving in time amounted to 0.273 minutes or a 34 percent saving in time with a corresponding 51 percent increase in production.

9. Some Examples of Reducing Cutter Approach

The importance of designing a fixture to take advantage of the shortest cutting distances on some classes of milling machine work are illustrated in Fig. 13.

In order to illustrate this principle, at A, the piece is held in a vertical position and the direction of cut is horizontal. This required a longer cutting distance than at B, where the piece is held horizontally in the fixture and the center line of the cutter is in a line with the center of the bosses to be milled.

A chart is given listing 14 different jobs where changes of design resulted in reduced cutter approach.

A comparison is made of:

1. Old and new travel distance
2. Old and new cutting time
3. Savings in an eight-hour day, percentagewise and in minutes.

Changes in the fixture design on the jobs listed resulted in a total saving of 946.0 minutes per 8 hour day or a net saving of 14.1 percent of the total time.

10. Redesign of Fixture for Milling Slot

A completely different design of fixture was the answer

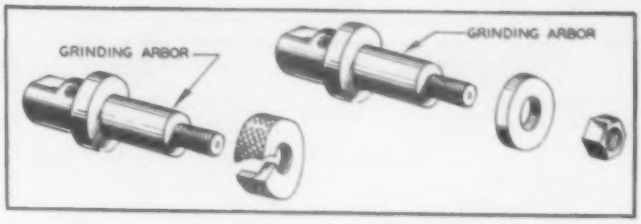


Fig. 8: C (left); D (right).

to a slot milling problem. In the original method, a special vise-type milling fixture was used, (see E, Fig. 14) for holding thin wall pieces and milling slots across the end. A plain six-inch milling cutter was used, mounted on an arbor in a horizontal milling machine. An approach to cut distance of 1.73 inches was required when using this cutter and the total travel of the table at machine feed amounted to 4.43 inches. Due to the thin wall section of the piece, a low feed of 1⅜ ipm was required in order to avoid too much pressure on the piece which would cause the machine table to jump, as one tooth of the cutter would run off of the work before the next tooth engaged. Sometimes the cutter caught the work and pulled up the piece in the fixture. Climb-milling was tried without success.

A new fixture (See F, Fig. 14) was designed so as to use a half-inch end mill mounted in the spindle of the machine. Using this fixture, the cutter approach was reduced to 0.250 inches and the total cutting distance to 1½ inches, while an increased machining feed of 3½ ipm was obtained.

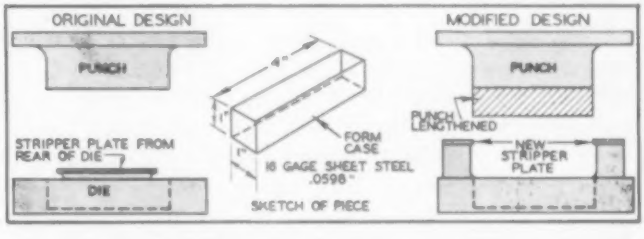
The old time required to mill the slot was 3.22 minutes, compared with a new time of 0.42 minutes with a resulting saving of 87 percent in time. The handling time and machine manipulation time was approximately the same with either fixture.

Where Change in Design Reduced the Time to Place and Remove the Work in the Fixture

11. Drilling Fixture on Automatic

Fig. 15 shows a method of clamping a piece into the fixture

Fig. 9



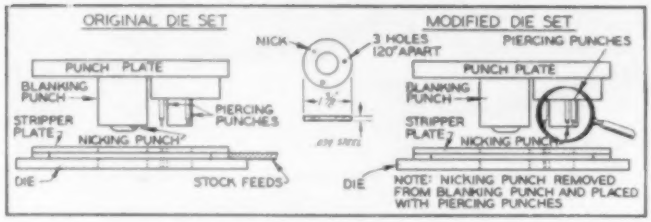
TIME FOR OPERATION

	(using old die) ORIGINAL METHOD	(using new die) NEW METHOD
Base Time	.025	.025
Allowance for area of piece	.010	.010
" " " adhesion	.003	.003
" " " one way only	.003	.003
" " " stripper	.002	.002
" " " contoured slots	.004	.004
" " " pick to remove	.050	—
" " " air reject	—	—
" " " handling	.009	.009
" " " arrange pcs. on press	.002	.002
TOTAL MINUTES	.108	.058

46% SAVINGS

NOTE: The base time is used on all jobs and is the time for the complete operation on the simplest job. Additional allowances are made for special conditions as shown above.

Fig. 10



Pierce, Nick and Blank

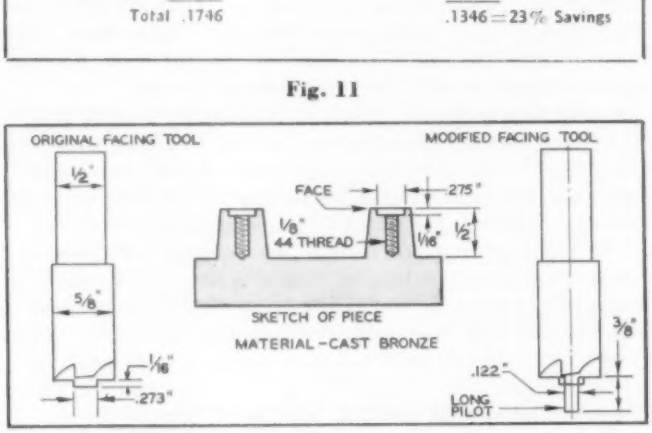
BASE MINUTES FOR OPERATION—.0106 MINUTES

Operation: Pierce 4 holes, nick and blank
Machine: Punch Press

By having the nicking punch with the piercing puches as shown above it is possible because of the support under the punch to punch a deeper nick into the piece which will eliminate a searching element by the assembler which amounts to .04 base minutes.

OLD METHOD	NEW METHOD
Blanking — .0106	.0106
Assembly — .1640	.1240
Total .1746	.1346 = 23% Savings

Fig. 11



DETAIL OF TIME IN MINUTES

	(using old tool) ORIGINAL METHOD	(using new tool) NEW METHOD
Place and remove to jig	.040	.0400
Locate under tool	.029	.0045
Face (1 boss)	.020	.0200
Turn part and jig	.015	.0150
Locate under tool	.029	.0045
Face (2nd boss)	.020	.0200
Gaging allowance	.002	.0020
Oil spindle (every 25 pcs.)	.002	.0020
TOTAL BASE MINUTES —	.157	.1080

SAVINGS IN TIME — 31.2%

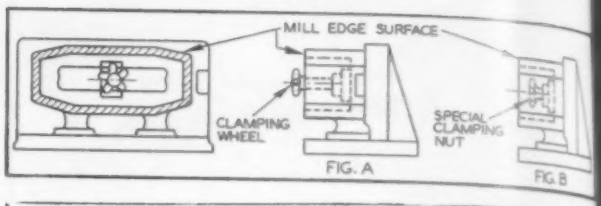
for drilling a number of holes using an automatic drilling machine. Four bolts and washers were positioned, tightened and assembled for every piece. As the drilling was completely automatic except for loading and unloading, the operator was required to run other machines during the time the machine was drilling. The work elements consisted of the following:

a. Place piece and fixture
b. Place top plate, four bolts and washers
c. Tighten
d. Start machine

After the machine has completed the actual drilling the following work was done by the operator:

a. Loosen four bolts
b. Remove four bolts from washers
c. Remove top plate
d. Remove piece

Fig. 12



ELEMENT TIMES	Figure A FEED 10"/M SMALL CUTTER AROUND PERIPHERY MINUTES	Figure B FEED 38"/M LARGE CUTTER STRAIGHT ACROSS MINUTES
Place and remove	.120	.092
Tighten	.264	.210
Adjust machine to cut	.070	.070
Mill cut	.310	.116
Clear cutter	.049	.052
TOTAL TIME	.813	.540
TIME SAVINGS PER PIECE		.273
% SAVINGS		34%
% INCREASE IN PRODUCTION		51%

In changing the operation, hole was drilled and tapped in the center of the fixture. An Allen head bolt and a "C" washer were used to hold the top plate and part of the fixture.

The old time required for the operator to do his work amounted to 1.55 minutes. After the fixture was changed, the new time for the same operation now takes 0.63 minutes and results in a saving in time for this operation of 59 percent.

Re-Analysis of Entire Work Place and Redesign of Fixture to Reduce Number of Workers Required

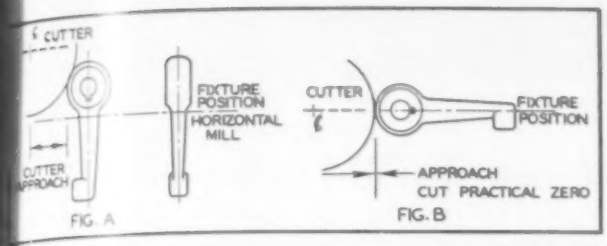
12. Assembly of Bearing and Cages

This operation was selected to show the effect of a complete re-study of the entire work place and re-design of other fixtures to reduce the number of workers required. In Fig. 16 the old work place layout for assembling bearings and cages is illustrated. The assembly bench was designed and built so that three girl operators could work as a unit. Two girls would assemble the rollers or pins in the fixtures working at the work bench. These girls would then slide the fixture along the back of the bench to a girl stationed in front of the press. The girl in front of the press would assemble the end plates and set the bearing or cage together by pushing on the foot pedal and operating the press. She would then remove the bearing or cage from the fixture and place them in a tote box at her left. The fixtures would then be slid back along the table to be refilled by the other two girls.

The reason for this method of assembly was to increase the production per press. Actually, there was more than enough press capacity and the tool designer apparently lost sight of the fact that labor cost was a more important consideration than output per machine.

Fig. 17 illustrates the new method of assembling bearings and cages. One operator assembles the rollers and pins into the fixture and then puts on the end plates. The dial mounted in the press revolves continuously and the press automatically trips when the bearing or cage comes into the position under the ram. After staking the operator removes a finished bearing or cage from the fixture and drops it down the chute (shown in front of dial plate) to the tote pan at the rear of the press.

Fig. 13



Comparison of Travel of Cutter and Time Required

Operation	Old Travel Distance	New Travel Distance	Cutting Old Time in Min.	Cutting New Time in Min.	Min. Saving in 8 Hours	% Savings
Straddle mill ends	2.25	.9375	.102	.043	85.0	17.7
Straddle mill bosses ...	2.6875	1.625	.135	.081	67.0	14.0
Face mill	2.84	1.18	.218	.091	154.0	32.1
Straddle mill bosses	2.50	1.375	.147	.081	81.0	16.9
Saw cut	1.50	1.125	.065	.049	41.0	8.6
Straddle mill and saw cut	2.62	1.06	.188	.076	109.0	22.7
Straddle mill bosses	1.375	1.06275	.063	.048	35.0	7.3
Straddle mill bosses	1.125	1.00	.09	.08	10.0	2.8
Straddle mill bosses	2.05	.875	.10	.042	71.0	14.8
Straddle mill shaft	1.875	1.5625	.085	.071	16.0	3.3
Straddle mill and saw cut	2.375	1.19	.170	.085	141.0	29.4
Straddle mill bosses	2.125	1.50	.097	.069	39.0	8.1
Straddle mill bosses	2.06	1.312	.093	.060	43.0	9.0
Straddle mill bosses	2.5625	1.5625	.116	.071	54.0	11.3
				TOTALS	946.0	14.1

14 jobs on 8 Hour Days Basis—6720.0 Minutes
% SAVINGS — 14.1%

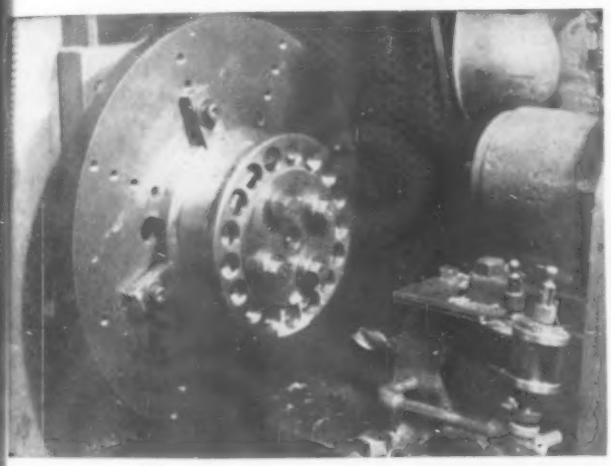


Fig. 15

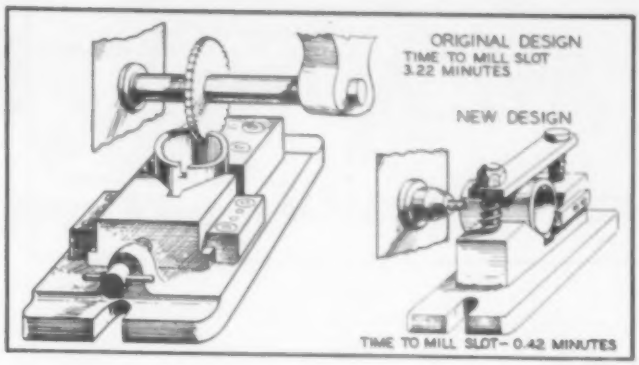


Fig. 14: E (left); F (right).

The cost of making up the dial assembly fixture was little more than the original amount spent to design and build the work bench for the three operators. The new method reduced the labor time required 64 percent. A slight loss in volume of output per press was encountered when going from three operators to one operator. In other words, one operator turns out almost as much work as three operators did before the change, resulting in a saving of about 60 percent.

Importance of Shop Follow-up by Tool Design Department

13. Use of Fixture on Wrong Machine

The fixture designed for this job calls for milling four pieces at a time using four formed tooth HSS cutters mounted on an arbor. With four HSS cutters a speed of 79 sfpm and a feed of 5.3 ipm was obtained in the shop. By using only one cutter a speed of 175 sfpm and a feed of 27 ipm was used satisfactorily. Fig. 18.

In other words, when milling four pieces at a time as called four by the fixture, a production of 180 pieces per hour was obtained. Using the same fixture but milling only one piece at a time resulted in a production of 285 pieces per hour. The question here is why should not four cuts be made as fast as one cut? The job was routed to a machine with insufficient power.

This is an example where proper use is not being made of a fixture. There should be a closer coordination between the tool design department and production routing to the shop so as to protect their interest as well as to know what is going on.

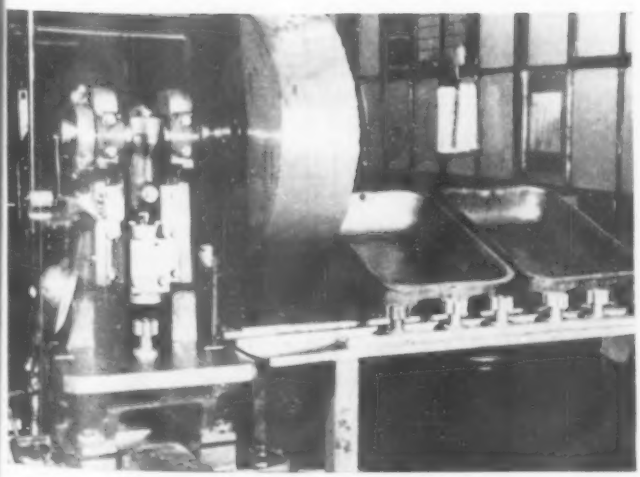


Fig 16

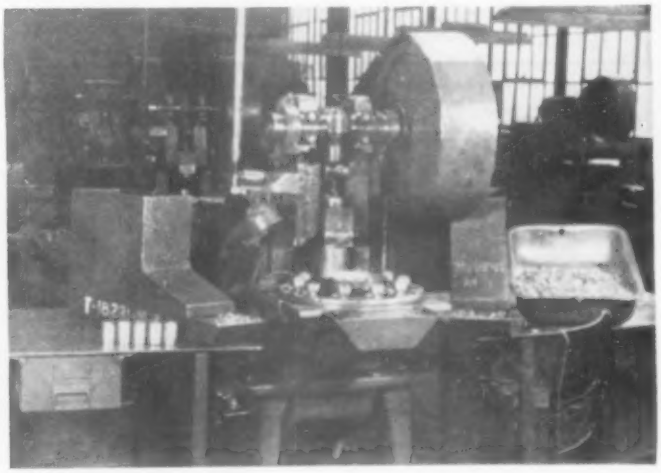


Fig. 17

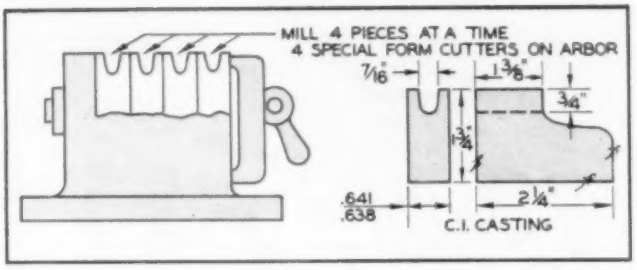


Fig. 18

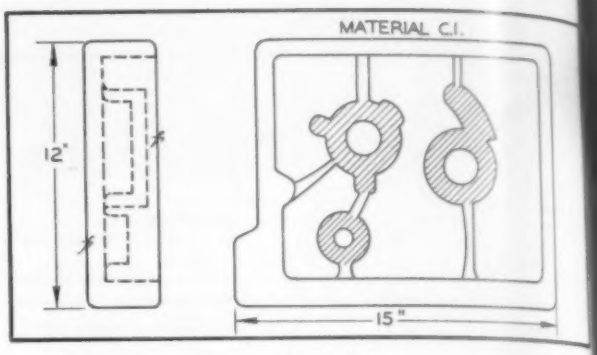


Fig. 19

Use of Standard Data to Determine Whether or not Fixture Should be Made

14. Milling Bosses—Table Versus Fixture

There are some types of work where there is not much advantage in building a fixture. Most tool designers are aware of many such applications. The use of standard time data to estimate both methods will give the answer to the question of whether or not to design a fixture.

The illustration shown in Fig. 19 has been taken from actual practice, and by applying standard element times to both the fixture method and the table method, it was determined cheaper to dispense with the fixture. A 50 percent decrease in handling was shown to result by the application of standard time data. This was validated in actual practice.

Some Examples of Handling Times for Component Parts of Fixtures

15. Time for Component Parts

Some representative time values for the use of various simple clamping or fastening devices in actual production are given in Fig. 20. For the convenience of the tool engineer when referring to these charts, total times are given. For example, on the spoke nut, the time of 0.12 minutes per occurrence is the sum of the various element times required for use, such as "grasp", "tighten", and "grasp" and "loosen".

An examination of these values shows that quick acting clamps are the quickest for shop use. Various other devices require a time ranging from 0.07 minutes to 0.22 minutes shop use.

Once tools are made, it is expensive to change them. One of the purposes of this article is to show what may be expected of the tools in terms of actual production. By means of such analysis, the tool engineer may make many modifications and changes in the design before the tools are made. Element time data are practical since they are based on actual studies made of good shop performance. The system enables the tool engineer to accurately estimate expected production and the results predicted can be obtained. Its use will result in improved coordination between the tool design department and the shop departments and tool engineer to present accurate estimates of tooling costs production engineering departments. It will enable the and expected results to management.

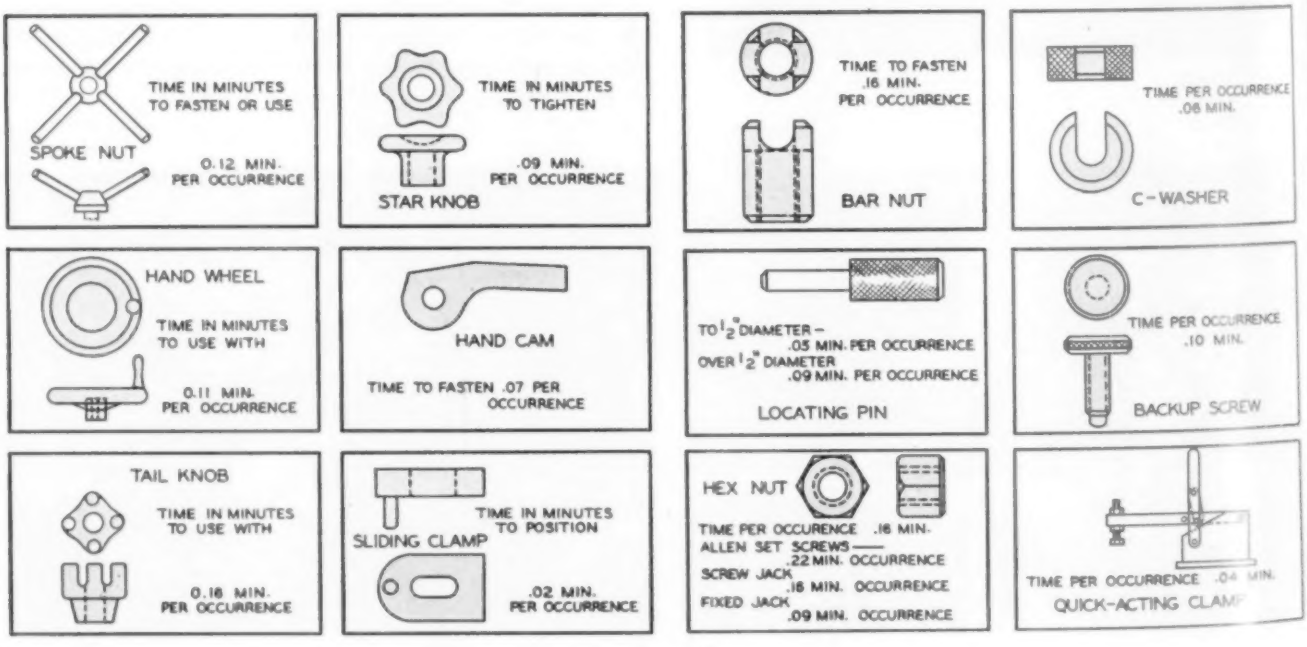

SPOKE NUT
TIME IN MINUTES TO FASTEN OR USE
0.12 MIN. PER OCCURRENCE
STAR KNOB
TIME IN MINUTES TO TIGHTEN
.09 MIN. PER OCCURRENCE
TIME TO FASTEN .16 MIN. PER OCCURRENCE
BAR NUT
TIME PER OCCURRENCE .08 MIN.
C-WASHER
HAND WHEEL
TIME IN MINUTES TO USE WITH
0.11 MIN. PER OCCURRENCE
HAND CAM
TIME TO FASTEN .07 PER OCCURRENCE
TO 1/2" DIAMETER — .05 MIN. PER OCCURRENCE
OVER 1/2" DIAMETER .09 MIN. PER OCCURRENCE
LOCATING PIN
TIME PER OCCURRENCE .10 MIN.
BACKUP SCREW
TAIL KNOB
TIME IN MINUTES TO USE WITH
0.16 MIN. PER OCCURRENCE
SLIDING CLAMP
TIME IN MINUTES TO POSITION
.02 MIN. PER OCCURRENCE
HEX NUT
TIME PER OCCURENCE .16 MIN.
ALLEN SET SCREWS — .22 MIN. OCCURRENCE
SCREW JACK .16 MIN. OCCURRENCE
FIXED JACK .09 MIN. OCCURRENCE
TIME PER OCCURRENCE .04 MIN.
QUICK-ACTING CLAMP

Fig. 20

Practical Tips on Milling Fixture Design

By R. M. Strickland

Chief Engineer
Geometric Tool Company Division
Greenfield Tap & Die Corporation

1. When starting the fixture design drawing, first draw (Using colored pencil) the machine table milling cutters, machine arbor, collars, overarm (and overarm support if used) before the actual design work is started. This step is of the utmost importance as it will help to eliminate any possibility of interference between the various machine parts and the fixture as it is being designed. Many times these interferences are not discovered until the fixture is ready to mount on the machine. Don't assume anything and check carefully to be sure nothing has been overlooked such as machine control levers, table guards, spindle quill, etc.
Show arrow on drawing giving proper rotation of spindle for job to be done. The direction of rotation of cutters is important and some formed relieved cutters can only be operated in one direction of rotation in respect to the work to be milled.

2. Draw the work in position in another color to distinguish it from the machine. Take particular pains to show the work as it will be received into the fixture. Show the amount of material to be removed from the surface or surfaces to be milled. If other surfaces to be milled at a later operation are in their rough condition show them rough and not finished. Extreme care and accurate drawing of the work at this point will help to eliminate errors and misunderstandings later on. In this way the designer becomes familiar with the work quickly and the same drawing can be used for the layouts of other operations which saves considerable time. Many times part drawings are not drawn to scale and questionable conditions are discovered before considerable design work is underway. It is sometimes advantageous to draw the work on a separate piece (or pieces) of vellum tracing paper so it can be positioned on the machine layout (#1 above). This is very helpful in arriving at the best location for the work in respect to the machine. When the best position has been selected it is a simple matter to trace the work on the final drawing.

3. Consider safety features. Study location of machine and fixture control carefully for operator safety.

4. Make construction substantial keeping fixture law as possible for rigidity.

5. Be sure the milling thrust of the cutter is against the solid portion of fixture. Avoid milling thrust against clamp (or clamps).

6. Simple clamping is desirable, and very substantially made. Avoid complicated clamping methods using indirect means. Serrate clamping surfaces if added holding power is needed.

7. Use spherical washers on studs and bolts to allow the clamps to swivel and hold work securely.

8. The use of springs under clamps is desirable in most cases. This greatly assists operator when loading work by keeping clamps in proper position.

9. Provide means for preventing the clamps from turning when being tightened. Pins or other methods of positioning clamps when loading work are also advantageous.

10. Try to use standard milling cutters rather than specials. Many times a slight alteration in the height of a clamp will make it possible to use standard milling cutters. Hold the diameter of the milling cutters to a minimum in keeping with good proportion. Offset clamps can be used to advantage in many cases to allow greater clearance for cutters and further reduction holes for pins, etc., in case of breakage.

11. All stubs, pins, and other perishable parts should be easily replaceable. Provide knockout holes for pins, etc., in case of breakage.

12. The locating surfaces for work should be hardened and easily resurfaced or replaced. Avoid broad locating surfaces. Locating points or surfaces must be in full view of operator so work can be seated properly.

13. Spring plungers can be used to advantage when locating and supporting rough castings. Screw type jacks are commonly used but are apt to spring the work if not carefully used.

14. Consider the use of cutter setters or the equivalent to assure uniform work. Cutter setters must be positioned so as to be out of the way of the milling cutters in their normal operation position. It is usual practice to allow for feeler gages or paper between cutter setter and cutters when setting up. Stamp instructions on cutter setter so operator will know what thickness feeler to use.

15. Power or rachet wrenches will help to speed up the loading and unloading of work. Specify proper wrench for the work to be done. Don't expect operator to supply his own wrenches as this usually results in abuse to fixture or failure to hold work properly. Keep number of wrenches needed to operate fixture to a minimum. Socket type wrenches are much safer for operator than open end style wrenches.

16. Consider reversible base keys if fixture is to be used on more than one make of machine with different size key slots.

17. Many standard quick acting clamps are available and can be used to advantage on certain classes of work. Be sure clamp has capacity to hold work properly.

18. Air or hydraulic cylinders for numerous applications are available from stock. Foot control valves leave operator's hands free to load and unload fixture. Engineering assistance is supplied gratis from the makers.

19. The gaging of the work while still in fixture is sometimes very desirable. Castings and forgings when once removed from fixture for gaging are usually very difficult to put back in exactly the same position.

20. Standard manual or automatic indexing fixtures of various sizes are available. Usually simple work holders are all that are required. A variety of work holders makes this type of equipment extremely versatile, where a wide variety of similar parts are to be milled. Some styles permit two or more stations to be used making it possible to load one or more stations while others are being milled.

21. Standard air operated vises on the market offer a wide variety of holding equipment.

22. If the work is small consider the use of special vise jaws instead of a special fixture.

23. A master part (replica of work) is sometimes used to advantage on short run jobs. Master parts save layout time as well as to help eliminate mistakes when setting up. A master part shows operator exactly what is expected as finished.

24. On short run jobs consider using two or more cutters on the same machine arbor to reduce set up time. Example: Use of one pair of straddle mills and a convex radius cutter on same arbor makes it possible to do two operations in one set up. Suitable blocks or stops can be used to make the moving of machine table simple and positive.

25. Provide proper stamping instructions for fixture. It is desirable on castings to finish the surface before stamping or provide a stamping pad or raised surface for this purpose. Proper identification and legible marking saves time and eliminates errors.

Milling Machine Requirements and Other Important Considerations

1. Climb milling can often be used to advantage as it tends to hold work down. This is desirable on thin parts that are apt to lift under the cut. Be sure the machine is capable of climb milling, otherwise damage to machine or fixture may result.

2. Check capacity of machine tool equipment. Do not overload the machine as loss of production will result if power requirements are insufficient.

3. For very heavy cuts be sure arbor is of sufficient size and well supported to provide rigidity. Use center arbor supports where possible.

4. Place the supporting arms and arbor supports to the cutters as work or fixture will permit. This will help materially to provide a good finish and reduce chatter.

5. When using two or more fixtures on the same machine be sure to specify that they be exact duplicates or be in good alignment with each other if uniform work is required.

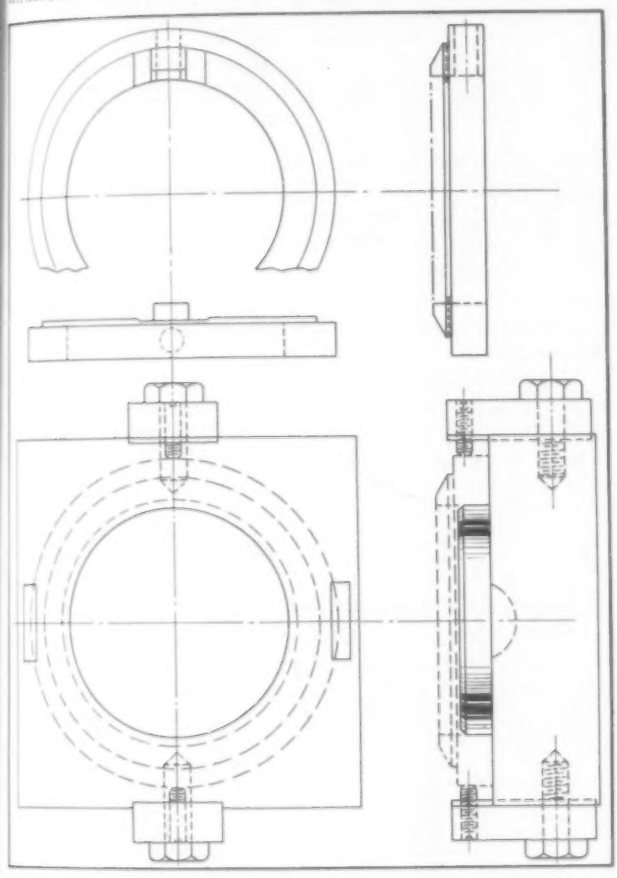
6. Check speeds and feeds for work to be done. Possibly other speed change gears will be required to do the work more productively. Consult handbook for estimated speeds and feeds if necessary or maker of machine.

GADGETS

Ingenious Devices and Ideas to Help the Tool Engineer in His Daily Work

Milling Fixture for Drive Collar

Herewith is shown a drive collar—Fig. 1—such as used on Kearney & Trecker milling machines, and the simple but efficient fixture—Fig. 2—used for milling. The first operation is boring the hole and facing both sides. The beveled portion, shown partly in dot-and-dash, is also machined at this time. Actual dimensions are not shown as they are not pertinent to the theme. The next operation is to mill off the beveled portion so as to leave the two projections of the opposed tongue. It will be noticed that there is a slight undercut on each side of the tongue.



The tongues on the drive collar, shown in Fig. 1 at top, are held for milling in the simple fixture shown in Fig. 2, at bottom.

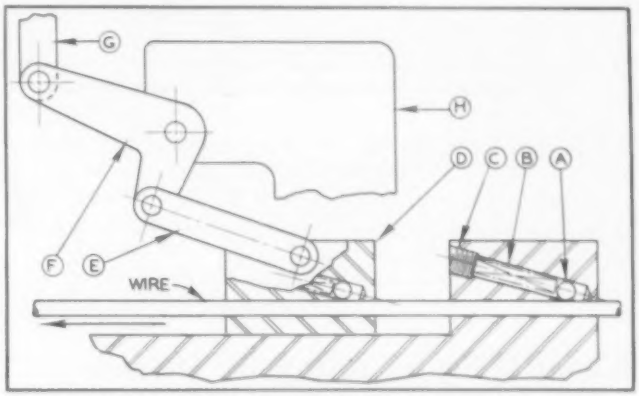
The milling fixture consists of a simple, square block which incorporates a locating plug, turned for a snug sliding fit into the bore of the workpiece. On opposite sides of the bore, and central with the centerline of the plug, are two plates, keyed in place and held with cap screws. Each of these plates is drilled and tapped for a socket set screw. Two semi-circular notches, milled equidistant from the center line and at right angles to the two blocks, are used to locate the milling cutters. The base block is case hardened after machining.

In use, the fixture is held in a milling vise. The workpiece is then located and clamped by the two set screws and the milling done with gang cutters, properly spaced. Climb milling holds the workpiece down against the face of the fixture. Since production is low, this simple fixture serves satisfactorily and without any reasonable possibility of distorting the work.

Robert Mawson
Providence, R. I.

Feed Mechanism for Narrow Stock

A method of feeding wire or narrow strip stock into a die is herewith illustrated. The wire enters from the right and passes through the clearance hole in the base block. Another hole is reamed in the block at an angle to and intersecting the clearance hole, as shown. A standard steel ball, A, is dropped into this second hole and is backed up by a coil spring, B, held in by a set screw C. This entire block is held solidly to the lower die shoe.



Flat stock or wire may be automatically fed in a punch press by means of the simple stock feed shown.

A second block, D, is mounted in a T-slot—not shown—so that it may slide to and fro from left to right. This block, equipped with a clearance hole, ball, spring, and set screw plug in the same manner as the base block, is mounted so that both clearance holes are in line. This block is further connected by the links E and G, and the bellcrank, F, to the upper die shoe. The bellcrank is mounted on a support, H, fastened to the lower die shoe.

On the up-stroke, block D moves to the left, carrying the wire, which is gripped between the ball and the lower side of the clearance hole. The forward moving wire slightly compresses the spring in the right-hand block, yet allows the wire to pass through freely. On the down stroke of the press, the right-hand block grips the wire in the same manner while the movable block slides free. Note that the wire moves in the direction of the arrow. The principle only is shown, since design would naturally vary with different applications. The timing and stroke may also be varied by several means.

Merle L. Deckard,
Detroit Chapter, ASTE

To Hold Leads in Compasses

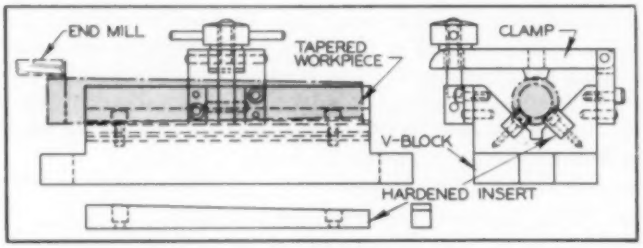
It often happens that, after a period of use, the chucks of compasses or bow pencils either become worn or sprung so that they will not securely hold the lead, which then slips or turns. Rather than tighten the screw until the latter strips, simply run a tap in the hole, the root diameter of which must be less than the diameter of the hole. This will provide a "knurl" which will hold the lead without slipping.

George Hooey
Toronto Chapter, ASTE

The Tool Engineer pays regular page rates for accepted contributions to these pages, with a minimum of $5.00 per each item.

Fixture for Tapered Shaft

Having to mill a slot in the end of some tapered shafts, the simple fixture shown is not only inexpensive but proved itself highly efficient. The base is a V-block, with two slots milled in the flanks of the Vees. Into these are inserted two tapered inserts which, after hardening and grinding, are screwed to the base. A swing clamp locks the workpiece in place.



Tapered parts may be milled in a V-block fixture having tapered inserts.

This design obviates the use of a compound sine plate or V-block with sine plate; furthermore, other inserts can be made straight or variously tapered to suit different jobs. With slight modification the fixture can be used as a grinding or drill fixture.

Arthur F. Hird
Worcester Chapter, ASTE

Wiring Hints for Automatic Devices

The present trend towards mechanization and automatic machinery has resulted in a great many home-made devices, many of which are electrically controlled. The actual wiring on these machines is most frequently carried out by the plant maintenance electrician who may not be too familiar with wiring of this type. For satisfactory performance, the following elementary rules should be observed:

All control devices, such as relays, selector switches, or timers, should be securely housed in a steel enclosure. All wiring within this box should be of the single conductor wire type rather than the stranded wire type, since the latter has very little rigidity and tends to flop inside the box and cause mechanical interference or other electrical troubles.

As an example, a wire of this type was caught in the door of a steel cabinet because of its excessive slack, the insulation was ruptured and the resulting short circuit caused a malfunctioning of the machine which it controlled and also the loss of the operator's finger. In order to avoid excessive wire slack inside the box, it is also advisable to make all connections by means of a terminal block with screw terminals rather than by splicing and taping the wires.

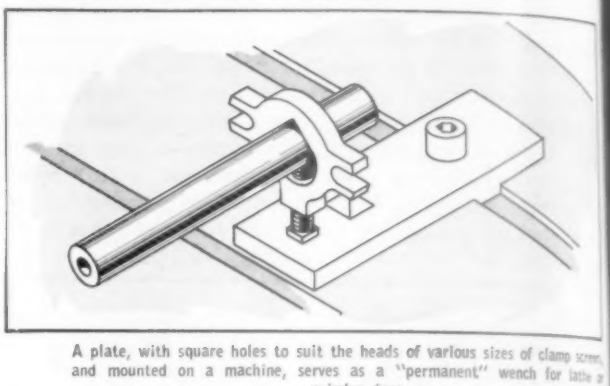
All wires leading from the machine into the control box should preferably be of the metal covered BX cable type so as to avoid accidental injury to the wires; or, for short runs that can be well supported, solid conduit should be used. All wiring inside the box from the above mentioned terminal blocks to the various relays, timers, and switches should be made as neatly as possible, and the individual wires supported at frequent intervals so as to prevent undue vibration which may cause breakage or loosening of the terminals.

A box, neatly wired as recommended, will cause considerably less trouble than the haphazard methods frequently encountered in home-made installations and, in case of trouble, it is much easier to trace a circuit with the properly wired box than in one that is not. For those unfamiliar with this type of device and intending to build one for the first time, it may be instructive to inspect the wiring box supplied with some of the electrically controlled machine tools which are, as a rule, a model of neat and safe wiring.

P. H. Winter
Syracuse, N. Y.

One-Hand Dog Wrench

Securing a driving dog to a workpiece during grinding is usually a two-handed job and calls for picking up and putting down a suitable wrench for tightening the screw. Such repetitive picking up and putting down of tools is slow and exhausting, particularly when it has to be performed hundreds of times in one working shift.



A plate, with square holes to suit the heads of various sizes of clamp screw, and mounted on a machine, serves as a "permanent" wench for lathe or grinder dogs.

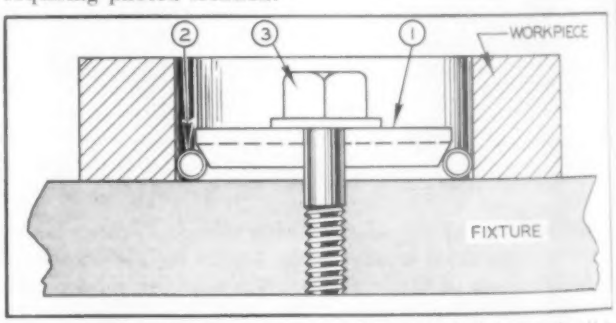
To reduce fatigue and prevent losing tools, the wrench plate illustrated was made up and clamped to the top surface of a grinder table. Any number of square holes, to match the screw heads on the driving dogs, can be pierced in the plate. When removing a workpiece from between the grinder centers, the screw head is dropped into the square hole in the wrench plate, and a quick jerk on the work piece loosens the screw.

The driving dog may be left in the wrench plate hole and a new workpiece pushed into the dog, when a simple twist will secure the dog to the workpiece. The wrench plate can become a permanent accessory to the grinder and is always conveniently placed and ready for use.

F. E. Riley
London, England

Adjustable Centering Pilot

The sketch shows a variation of an adjustable pilot which may be used to locate parts having cored or rough machined holes for drilling, milling, turning, and assembling operations requiring piloted location.



A bevelled plug and a coil spring, the latter joined in a circle, aid in centering parts having cored or rough machined bores.

The pilot itself is simple in construction and operation, and consisting of a tapered expandor plug, Detail No. 1; a length of coil spring connected together to form a circle, Det. No. 2, and a clamping screw, Det. No. 3. The functioning of the pilot is the same as any other expanding type mandrel or pilot, which is the loading of the part and tightening of the clamping screw.

The advantages of this type of pilot on certain applications is the greater range of expansion and more positive centering in cored holes as the coil spring will distort and conform to the irregularities of the cored hole.

O. C. Steffens
St. Louis, Mo.

North East West South IN INDUSTRY

The board of directors of the **Kent-Owens Machine Co.** have announced the election of E. W. **Donkel** as president to fill the post recently vacated due to the death of his father. Mr. Donkel has served as vice-president and general manager for the past six years.

Following 20 years of activity in the fields of engineering, designing and production, **Robert C. Blackinton** has been named plant manager of the **Pioneer Engineering and Manufacturing Co.** Prior to his association with Pioneer, Mr. Blackinton was vice-president in charge of manufacturing for Federal Telephone and Radio Corp.

G. M. Calvert and Frank Jeschke have formed the **Jes-Cal Co.**, sales representatives, with offices in Detroit. Active in the development of the honing industry, they operated the Jeschke Tool Co. until its sale to Micromatic Hone. Mr. Calvert has been connected with sales and engineering at Micromatic, and Mr. Jeschke formerly was factory manager of the Transmission Div., Reed Roller Bit.

John Neuman has accepted appointment as plant manager of **Midland Die and Engraving Co.**, according to recent announcement from that Chicago firm. Before joining Midland, Mr. Neuman owned and operated Newark Plastic Molds.

Construction is under way to restore the first iron works and blast furnace to be operated in the New World, one of America's earliest industrial landmarks, at Saugas, Mass. Completion is expected late in 1951.

The iron works, which dates from 1644 is being restored as a permanent tribute to the iron workers of colonial days and to their successors.

The Sturtevant Div., **Westinghouse Electric Corp.** has realigned its sales organization by the formation of two departments: one will concentrate on sales of air conditioning products and the other on air handling equipment.

Robert S. Cave has been named general sales manager of **Severance Tool Industries, Inc.** Prior to his connection with Severance in 1940, Mr. Cave was employed by the Bay City Div. of Electric Auto-Lite.

At a recent meeting of the shareholders of **Latrobe Electric Steel Co.**, the following directors were elected for the coming year: **M. W. Saxman, Jr., D. J. Giles, H. S. Saxman, G. E. Anderson, W. A. Seifert, A. S. Miller, J. M. Underwood, J. E. Workman,** and **J. R. Larson.** Mr. Workman and Mr. Larson, who were elected this year for the first time, are vice-president in charge of sales and vice-president in charge of production, respectively.

Increasing several of the district welding engineering staffs, **Lincoln Electric Co.** has added J. J. Chemerys, formerly of the Joy Mfg. Co., to the Syracuse territory; W. R. Karll, previously an industrial management consultant, to the Newark, N. J. office, and J. W. Brooks and R. G. Todd, recent engineering graduates, to the Boston and Tulsa staffs, respectively.

At its recent annual meeting the board of directors of **Raybestos-Manhattan, Inc.**, elected George R. Weber treasurer of the corporation; W. S. Simpson was elected secretary, and W. Ward Kievit was made a director. Mr. Weber has been a director and vice-president of the corporation since its formation in 1929, while Mr. Simpson, who also is assistant general manager, has been a director for two years. Mr. Kievit, comptroller since 1948 and secretary since 1946, has relinquished the duties as secretary in view of his newly added responsibilities.

The promotion of **Thomas A. Hammer, Jr.**, and **Irving R. Warshow** to assistant treasurer and assistant comptroller, respectively of the **Doehler-Jarvis Corp.**, was announced recently. Both men have been associated with the Doehler organization for several years.

Appointment of **E. H. Forsstrom** to the recently created position of director of training for **Allegheny Ludlum Steel Corp.** has been announced. Mr. Forsstrom, who joined the company in 1935, formerly was assistant manager of its Watervliet, N.Y., plant.

Appointment of **E. W. Connolly** as district sales manager, **Haynes Stellite Div., Union Carbide and Carbon Corp.**, has been announced. Mr. Connolly, who has been associated with Haynes Stellite for 11 years, succeeds R. D. Gunther, who has retired.

David S. Hunter has announced his resignation as advertising manager of **A. Schrader's Son,** Div. of Scovill Manufacturing Co., Inc.

Three steel foundry pioneers with individual records of 50 years of continuous service in the industry were honored at a division meeting of the Steel Founders' Society of America. The men were **Marshall Post,** vice-president **Birdsboro Steel Foundry and Machine Co.; Harry K. Pollard,** sales executive **Treadwell Engineering Co.;** and **E. M. Schumo,** executive vice-president, **Pennsylvania Electric Steel Casting Co.**

According to a recent announcement, the **F. J. Stokes Machine Co.** has entered into the field of vacuum metallizing with facilities for the metal coating of such products as plastics, crystals, glass, paper, textiles, optical parts, plus numerous other materials; technical assistances and service in pre-treatment, coating and after-treatment, as well as an advisory service available for consultation.

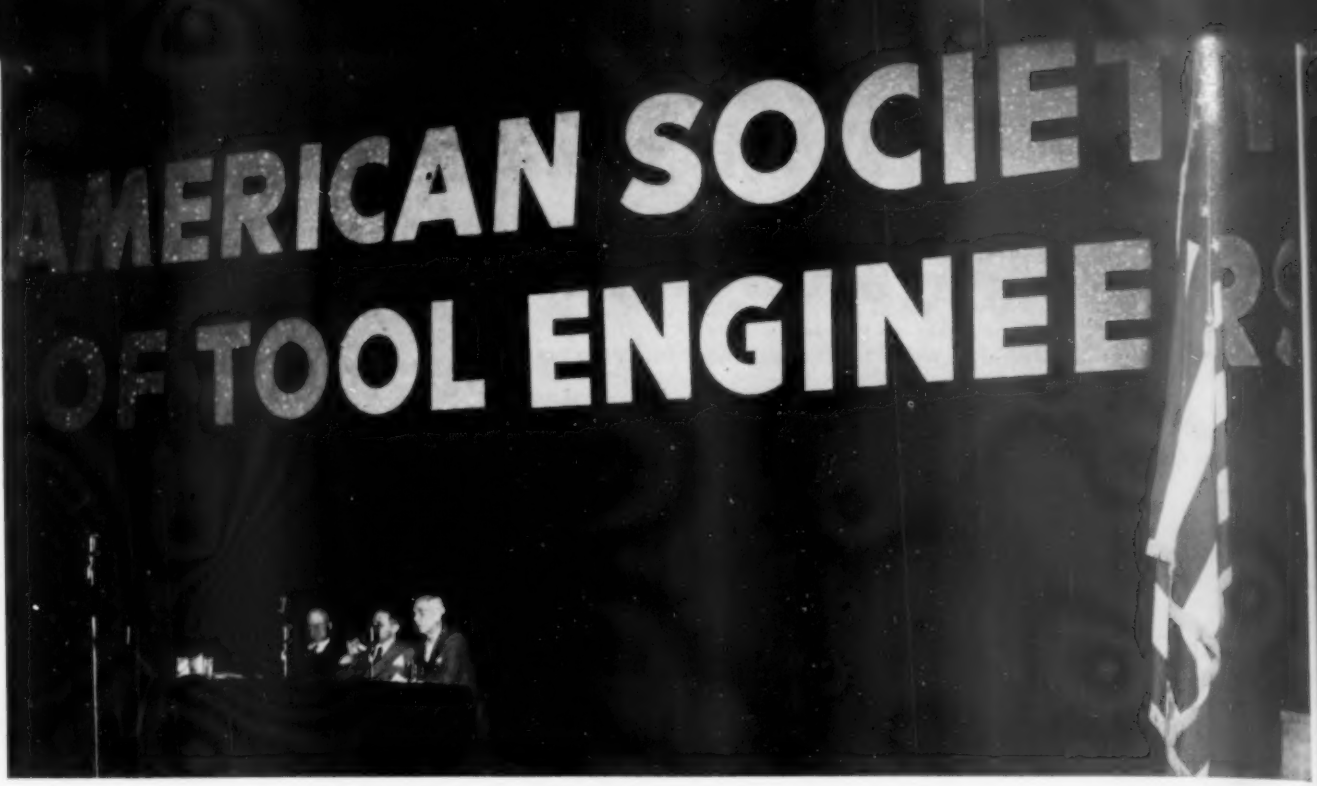
The physical assets and inventory of the **Merz Engineering Company** have been purchased by **Miklos Sperling** of the **Love Machine and Tool Co.** Management of the company, which will operate under the name of **Merz Engineering, Inc.**, includes Mr. Sperling, president; Katherine Roessner, secretary-treasurer; Earl J. Breech, vice-president in charge of sales; Chester D. Schuman, chief engineer, and Troy A. Wiley, works manager.

John Yezbak, director of public relations for The Timken Roller Bearing Co. for the past seven years, has opened an advertising and public relations office in Cleveland. Mr. Yezbak, who joined Timken when his earlier advertising agency, Advertising Associates, was suspended because of the war, is listed in Who's Who in Commerce and Industry and Who's Who In The Mid-West.

Harry Waldes has been named executive vice-president of **Waldes Kohinoor, Inc.**, to direct and supervise administrative affairs of the company.

Fay Henry Willey, founder and president of **Willey's Carbide Tool Co.**, died recently at his home near Brighton, Mich. Mr. Willey was one of the pioneers in the development of the tungsten carbide industry, as well as being active in the industrial diamond business.

Wynn F. Rossiter, assistant to the vice-president, **The Carpenter Steel Co.,** died recently in Hartford, Conn. Mr. Rossiter, who joined Carpenter Steel in 1924, was appointed to his latest position in 1949.



The nation listened at its loudspeakers to Dr. Edwin G. Nourse (right), former chief of the President's Council of Economic Advisers, discuss the outlook for the country's future at the ASTE convention in Philadelphia. Dr. Nourse was one of four leading economists participating in an Economic Forum at the Academy of Music. At left are Dr. C. C. Balderston, dean, Wharton School of Finance and Commerce, University of Pennsylvania, and J. A. Livingston, financial editor, Philadelphia Bulletin.

Industry Throngs Philadelphia Show, Takes Home Tools to Fight Inflation

Production Equipment Sales Hit New Peak, Exhibitors Want More Space in '52

FROM ANY STANDPOINT—exhibits, attendance, business activity, service to world industry, or physical management—the Industrial Cost-Cutting Exposition at Philadelphia, April 10-14, was ASTE's best show.

Industry said so, is still saying so. Exhibitors boast about the business they did, the high quality of prospects attracted. Visitors enthuse about the new ideas they picked up for slashing manufacturing costs. Even the blasé trade press terms it "the best ever."

Favorable Reaction in Letters

Congratulations and compliments pour into Society headquarters. Some are backed up with requests for space in the 1952 ASTE Exposition at Chicago. Not only from this year's exhibitors but from companies who missed out at Philadelphia.

First impression of the show was that parts of hundreds of plants had been assembled under one vast roof. And they had. For nearly every exhibitor who could do so had machines at work turning out consumer goods, making parts, or performing some new or improved operation.

There were no dominating exhibits. Some of the smallest drew the most consistent crowds. Each display played to a continuous audience. Everybody seemed to find what they were looking for. One industrial publication discovered material for a special article—in the distribution of compressed air to show exhibits.

Exhibitors had a tough time trying to see the rest of the show. They were kept so busy demonstrating their cost-cutting equipment that they couldn't break away to look at things to bring down their own costs.

Exposition Briefs

Exhibitors	335
Exhibit Space (sq. ft.)	87,875
Total Registration	18,483
Press Representatives	111
Total Attendance	*68,482

*Door count includes repeat visits

Escorted by instructors, students from engineering schools inspected displays, watched demonstrations and asked intelligent questions that won the admiration of exhibit attendants.

Chapter officers from other cities took back ideas for educational activities from an exhibit sponsored by local technical schools and colleges. All of the institutions represented are cooperating with Philadelphia chapter in developing tool engineering courses.

ECA-sponsored and other delegations from the Netherlands, France, Switzerland, England and other countries planned their schedules to include the show. Some built itineraries around the exposition.

More Buying Than in '48

Orders placed and business stimulated at the show definitely confirmed the Society's survey of the membership last fall. Returns on this questionnaire on anticipated buying of production equipment indicated that 79 percent of the larger companies, 55 percent of medium-sized companies and 28 percent of the smallest firms planned to buy more in 1950 than in 1948. One exhibitor re-

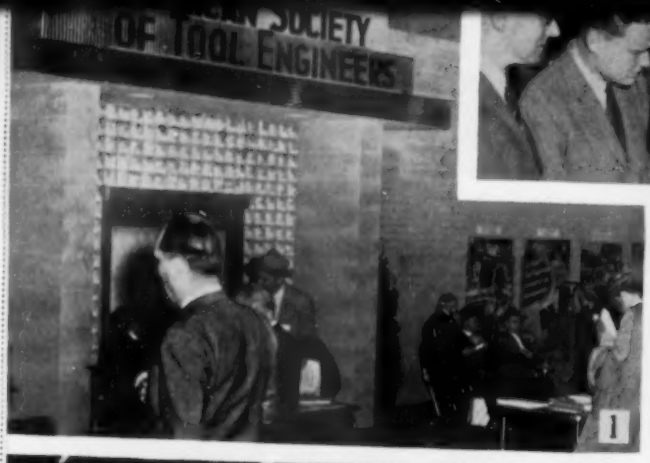
A.S.T.E. NEWS

By Doris B. Pratt

ported that his space had paid for itself the first morning of the show.

Ignoring the opening hour, registrants walked in with show personnel, stayed on

Top: Crowds like this, intent on seeing every device for expediting economical production, lined exhibits throughout week of the exposition. Below, left: R. B. Douglas (left) pins president's emblem on his successor H. L. Tigges during banquet installation ceremonies. Center: E. T. Cheyfitz, youngest man ever elected to CIO executive board, tells Economic Forum audience that management must dispel workers' fears before labor will accept its share of responsibility for full productivity. Right: Col. Sidney F. Mashbir, prominent Intelligence figure in the Pacific theatre of World War II, reveals in banquet address methods he used to get information from the Japanese. Upper center: President Douglas welcomes A. A. Stiehl of the General Electric Turbine Division to his first ASTE show. Below: An ECA-sponsored machine tool study group from the Netherlands arrives for show opening. Shown are: Prof. Richard Van Hasselt, Anton van Aalst, Catharinus te Beer, W. B. I. Hofman, Nicolaas Soeteman, Jan Tippeert, J. J. Prins, J. C. Gerlings, R. T. Escher, J. W. Schut, H. G. van den Berg, T. H. Huizinga, J. N. Joustra, W. H. Tromp, Jan Van Zwet, W. H. Braskamp, G. J. J. Janszen and L. A. Brown, ECA project manager. Bottom: Economic Forum figures get together at press conference in Union League Club. Seated, from left: Dr. Balderston and Dr. Nourse. Standing: R. B. Luchars, president, Industrial Press; E. L. Shaner, board chairman, Penton Publishing Co.; J. A. Livingston, R. B. Douglas, Paul Wooton, president, Society of Magazine Editors; W. D. Fuller, president, Curtis Publishing Co.; and J. S. Hildreth, president, Chilton Co.



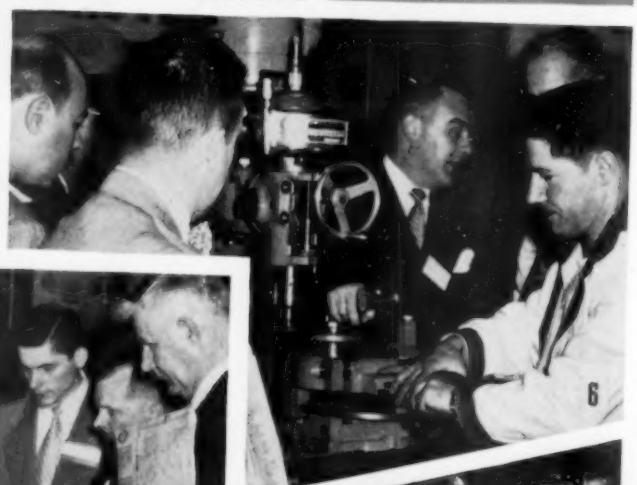
1

2

3

4

5



6

7

8

till past time to shut up shop. On the street they could be spotted blocks away by their big yellow envelopes crammed with exhibitors' literature, samples and souvenirs. Methodical in working their way through the show, the engineers checked off each exhibit listed on their carryall envelopes as they inspected a display, to be sure of missing nothing.

Although more culture- than industry-conscious, all Philadelphia warmed up to ASTE. Hotels, restaurants, shopkeepers liked their guests from the metal-working field. As one cab driver put it, "they're not hifalutin', but they know their business." And the *ASTE News* editor had to let a railroad ticket seller peruse *The Tool Engineer* exposition edition before he would assign her return space.

Televised and Broadcast

Television stations set up their cameras at the show and ground away to bring demonstrations and interviews to their audiences. (At least one direct sale was credited to this new medium, when a TV fan hustled over to buy a machine he had seen on his video set). Radio announcers interviewed Society executives over the air. Widely-read papers like *The New York Times* kept their readers abreast of show activities from day to day. News services carried the story by wire to thousands of papers in big cities and small towns.

A newspaper editor who had been working on an industrial story in his home city 100 miles away arrived looking for executives he had to talk to. "I couldn't find anybody around town," he complained, "they're all in Philadelphia."

Running concurrently with the exposition, the Society's 18th annual convention added a week-long program of technical sessions, plant tours, a banquet, and business meetings.

Outstanding Forum on Economics

One innovation of national significance was the Economic Forum presented Monday evening at Philadelphia's historic Academy of Music. Here the Society and its guests heard four of the country's outstanding economists present

1. The ASTE exhibit of Society activities is popular rendezvous for members. 2. Two French engineers inspect a metal hardness testing machine being demonstrated byy R. B. Coleman. They are René Loiseau, general manager of Le Bronze Industriel, Bobigny; and Michel Bindschedler, general manager of Fer Embal, Paris, France. The two men were members of a group of 14 French industrialists studying American and Canadian plants and technical know-how, under sponsorship of the American Chamber of Commerce in France. 3. A Scotch lass emphasizes the economy of a piston pin automatic classifying machine. Built for an automobile manufacturer, the machine checks 3000 pieces per hour, making seven segregations. 4. Walter Hullman (right) of the Autocar Co. looks over part for television set, pierced by magnetic perforating die. J. H. Walter explains that all dies in machine are interchangeable and adjustable. 5. H. F. Merchant (left) of Progressive Welder Co. sees old and new methods of automatic balancing contrasted by W. E. Stotsenburgh, an exhibit attendant. Indicator shows unbalance and angle on two linear scales. 6. A cam cutting machine holds the attention of this group. 7. Charles A. Pethybridge, New Britain Machine Co., Creston Ottemiller, Jr., C. F. Ottemiller and H. F. Fitzkee of W. H. Ottemiller Co., York, Pa., are fascinated by machine for coordinating holes by sound recordings. R. W. Moyer is demonstrator. 8. A discussion develops over work being done on a Swiss jig grinder.

Above, left: W. F. Wagner (left), ASTE past president, studies a universal tool setup for a cutter grinder, being demonstrated for a group of engineering students. Right: A highly versatile automatic machine that will drive nuts loosely to a stop or tight, in any desired cycle, gets an admiring audience. Next column, from top: The big yellow envelopes furnished registrants bulged with exhibitors' literature, samples, souvenirs and convention material. This crowd was among the 1400 visitors who registered during the first two hours after show opened. Three women officers of ASTE chapters watch the screen of a contour measuring projector where a part is being optically magnified for checking. From left: Miss Sara E. Swan, secretary of Elmira chapter and tool designer in that city; Miss Idalyn R. Cohen, publicity chairman, Greater New York chapter, and boiler designer at Babcock & Wilcox Co.; and Miss Virginia H. Martino (operating machine), Greater New York chapter secretary, assigned to special government work by Kollmorgen Optical Corp.

their views and predictions on as many aspects of the economic structure.

Keynoter was Walter D. Fuller, then president and now board chairman of Curtis Publishing Co., Philadelphia, and vice-chairman of the Committee for Economic Development. Mr. Fuller sees an expanded labor force rather than fewer jobs, responsible for the increase in unemployment.

More Mechanization, More Jobs

"We need widespread realization of the absolute necessity for the installation of laborsaving equipment in order to offset in some way the steadily increasing costs of wages and salaries. Only by this process can business expand and provide jobs for the growing population . . . It will take better tools, better selling, more ingenuity and high incentives to win prosperity for all in the future.

". . . We shall have strong political differences and every one of us has got to fight and sell if we are going to retain the individual freedom which has characterized America up to this point."

Adjustment of our economy has been hindered by the inflationary effects of continuing agricultural price supports intended to stimulate wartime food production, according to Dr. Edwin G. Nourse, former head of the President's Council of Economic Advisers.

"I do not believe that we have made the basic adjustments in the several parts of our economy that are needed to move us dependably toward a condition of internal equilibrium or harmony that will sustain activity and stabilize prosperity. Such prosperity would have to be based on a new price level consistent with the size of the national debt created and monetized by the strains and pressures of the late war.

"It strikes me that the United States today is indulging in the lazy relaxation of an Indian Summer daydream instead of facing the stern realities of clearly foreseeable storms and dangerous weather for business.

Must Put in to Take Out

". . . All the parties to the economic system need to face the issue as to what obligations they would have to assume and what limitations they would have to accept to attain a stabilized high-production economy. Instead of this, they are being encouraged to feel that they can use organizational and political power to get separately more out of the system than they are severally putting into it."

Dr. Nourse's views were broadcast over a national radio hookup. Other speakers'

Below, left: One visitor waits his turn at the microscope as another watches the drilling of 0.001-in. holes. Micro-drilling, employing new principle, can be done on a production basis with practically no hazard of tool breakage. Right: An overhead conveyor brings customers' parts to machines working on five production jobs and returns completed work for shipping.

1. Technical Session Chairmen Emil Kitzman and Edmund Hollingsworth of Philadelphia chapter (left and right) welcome their speakers, Dr. Max Kronenberg, Cincinnati consulting engineer, and T. F. Frangos of Haynes-Stellite Co. 2. C. M. Franklin (right) of Rochester Products Div., General Motors Corp., displays samples illustrating his talk on Diecasting Dies. From left: J. S. Bulmer, Dominion Die Casting, Ltd., Wallaceburg, Ont.; E. C. Ventres, Kennedy Die Castings, Inc., Worcester, Mass.; W. H. Tromp, Electrotechnische Mechanische Industrie, Netherlands; and J. O. Horne, national program committeeman who chairmanned session. 3. An ASTE party pauses in its tour of the Crown Can Co., to watch a high speed can end press operation. 4. J. G. Morrison of Landis Machine Co. (left) and B. A. Taylor of Chrome Electro-Forming Co. check their billing for joint appearance on session presided over by E. A. Lund (right) of Philadelphia convention committee. 5. Bert Banks (left) and Thomas Bridge of Canadian Arsenals, Ltd., observe how ball bearings are inspected, during tour of SKF Industries plant. 6. R. T. Hurley, president of Curtiss-Wright Corp., emphasizes a point during his talk on Machinability. A. H. d'Arcambal, former ASTE president, conducted session. 7. Two technical session groups get together for luncheon at Convention Hall restaurant. 8. W. Bonnafe of Lapointe Machine Tool Co. and C. E. Kraus of Kraus Design, Inc. (center) were speakers with P. A. Patterson (left) and F. J. DeFrates of the host chapter as chairmen. 8. Tool engineers headed for plant tours filled this fleet of buses twice a day. 9. Joseph Olender (third from left), International Harvester Co. speaker, introduces O. L. Cory, V. E. McCoun and J. V. Gaebler (at his left and right), also of his company, to J. R. Weaver, ASTE past president who headed Tooling for Truck Engine session, and F. J. Schmitt (extreme right), national program chairman. 10. During visit to The Budd Co. plant, these tool engineers try out seats in a new self-propelled railway car. 11. While the audience assembles, the speakers on an Automation program talk shop. From left: W. L. Mautz and T. E. Darnton of Oldsmobile Forge Plant, J. C. Whitesell of Philadelphia chapter, chairman; and Herman Zorn of V & O Press Co. 12. At the Westinghouse Steam Division an ASTE party mounts the bed of an 11½-ft Betts planer to see housing for power plant equipment. Shown are: E. A. Hedger, Nu-Way Stamping Co.; A. J. Dargis, H. E. Sherman, H. J. Hennell and W. Madden, General Electric Co.; F. W. Olsen, Cleveland Pneumatic Tool Co.; George Siebert, Maryland Dry Dock Co.; and C. L. Fessler, J. P. Ward Foundry. Visitors to Westinghouse were amazed at variety of work.

remarks were recorded and broadcast locally.

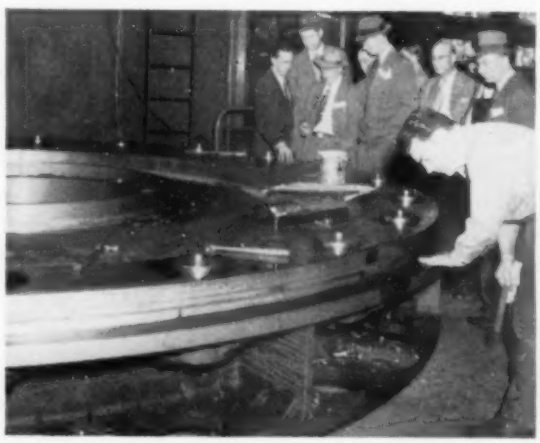
Dr. C. C. Balderston, dean of the Wharton School of Finance and Commerce, University of Pennsylvania, scored the mounting tax burden government subsidies and social benefits are heaping on business.

"The universal desire for security is understandable. What gives concern is an apparent lack of realism as to how much security the economy can provide and remain healthy. . . . It would appear that promises of future benefits are being made without realistic appraisal of [this] ability.

". . . And so the distant outlook for business seems to be complicated by this selfish and unthinking drift toward debt and inflation. As Emerson warned our grandfathers, 'Every sweet hath its sour —every advantage its tax.'"

Youngest man ever elected to the CIO's executive board, Edward T. Cheyfitz candidly sized up labor's position in the productivity picture.

"Unless management can apply modern managerial productivity techniques it cannot operate efficiently . . . But while the bulk of unions agree to the introduction of new machines, they have



Left: ASTE members and guests going through Baldwin Locomotive Works see a hydraulic turbine upper head cover a 42-ft x 17-ft vertical boring mill. Right: C. R. Pittsinger (right), Philadelphia technical session chairman, thanks N. L. Bean of Ford Motor Co. for his talk on Automation.

ot as yet grasped the fact that the acceptance of mechanization must include the acceptance of managerial controls.

". . . If we want labor to accept its share of responsibility for full productivity, we will have to eliminate the three fears which dominate the thought and work habits of millions of workers—unemployment, exploitation, managerial power . . . To dissipate the fear of unemployment, I suggest the achievement of continuous full employment. To dissipate the fear of exploitation, I suggest a policy of profit-justification. To dissipate the fear of managerial power, I suggest a partnership status for labor."

Anticipates Rising Production

Basing his outlook on the practical facts of business life, Joseph A. Livingston, financial editor of *The Philadelphia Bulletin*, expects business to continue strong to satisfy demands created by wartime developments, prosperity and changed living habits.

"As I see it the great demand for industrial equipment has not yet been completed. We're still introducing labor-saving machinery in this country . . . The Federal Reserve Board index of machinery production is at the highest level in a year. We're in for a period of rising production and rising productivity . . . We're entering a new phase of armament expenditures . . . Export of U.S. capital to under-developed countries . . . ought, ultimately, to work out as a great boon for manufacturers of equipment.

". . . Yes, we'll have a depression—when we satisfy the demand carryover from the war—housing, autos, hospitals, roads, etc. But that is a long time off yet. During the depression '30s, we were always sure that prosperity was just around the corner. Today we're just as sure, in the middle of prosperity, that depression is around the corner. We've lost faith in economic expansion.

"In my book we're in the middle of a long term upward surge, and you tool engineers will play a major part in developing it."

At the conclusion of their individual talks, the economists discussed each other's viewpoints and answered questions from the audience.

One voice from the floor asserted, "Engineers have confidence. I think we will win everything."

Industry Needs Atomic Energy

Robert B. Douglas, retiring ASTE president, opened and closed the meeting. Offering Society cooperation in working with government on atomic power development, he warned that the United States may lose the industrial race unless the nation's industry has an opportunity to apply atomic energy in manufacturing. Russia, he observed, is probably already experimenting with atomic energy for industrial purposes to try to compensate for her backwardness in power production.

N. M. Perris (left) and H. K. Keever (right) of Stevenson, Jordan & Harrison, Inc., hear C. F. Stephenson of Philadelphia chapter announce their presentation on Element Time Data.

Right, from top: Speakers Eugene Numrich (left) of Avey Drilling Machine Co. and J. A. Cupler II of National Jet Co. are complimented on their papers in the exposition edition of the April Tool Engineer by H. S. Hunt (right), who headed Drilling meeting which they addressed. Slug for 105 mm cartridge case made by cold forming methods using cold extrusion is subject of conversation between A. C. Jackson (left), Philadelphia chairman of Pressworking session, and J. P. Bowden of Heintz Mfg. Co., speaker. A guide at the RCA Victor plant calls attention of visiting tool engineers to operation along television tube production line. A. P. Gagnebin of International Nickel Co. jots down temperatures recommended in his talk on Ductile Cast Iron as Gardner Young, national program committeeman, looks on. Three members of the audience bring their question cards to W. O. Sweeny, Jr. (second from right), of Haynes-Stellite Co., speaker at Metamics session chairmanned by D. J. Heckinger (right) of Philadelphia chapter. Bottom, left: A banquet reception group gathers around E. W. Ernst (second from right), Handbook chairman, to toast him on his election to life membership. From left: V. E. Ericson, national director, Mrs. Ericson, G. A. Goodwin, national treasurer; Mr. and Mrs. Ernst. Right: H. L. Tigges, new Society president, assisted by J. J. Demuth, first vice-president, hangs duplicates of chapter membership awards presented at banquet, in ASTE Hall of Fame at headquarters building, Detroit. H. E. Conrad, executive secretary, looks on. Chapters honored for attaining quotas are: Springfield, Ill., Denver, Grand River Valley, Waterloo Area, Seattle, and Wichita.

Left: G. F. Eglinton of Lincoln Park Industries and R. B. Schulze of the Glenn L. Martin Co. receive certificates of appreciation from A. R. Diamond, Philadelphia convention committeeman, following their lectures on Pressworking of Metals. Center: John VanHammersveld, another Glenn L. Martin speaker, makes a sketch to illustrate theory of Design Economics for D. H. Renfrew, host chapter committeeman who introduced him. Right: E. J. Vanderploeg (second from left) of the Yoder Co. looks over slides accompanying his address on Cold Roll Forming with L. A. Yoder of Jones & Yoder, E. A. Koenig, Yoder Co., G. A. Rogers, Program Committee.

In organizing this outstanding event the Society had the cooperation of a committee of prominent publishers with J. S. Hildreth, president of The Chilton Co., as chairman.

Working with Mr. Hildreth were E. L. Shaner, chairman of the board, Penton Publishing Co.; R. B. Luchars, president of Industrial Press; and Paul Wooton, president of the Society of Magazine Editors, who acted as master of ceremonies.

* * *

The 22 papers on modern production methods and equipment read in 18 technical sessions represented one of the most ambitious technical programs ever attempted at an ASTE convention. All of the available papers have been published in the April, May and June issues of *The Tool Engineer*.

"Machinability," the lecture given by Roy T. Hurley, president of Curtiss-Wright Aircraft Corp., is expected to appear in a forthcoming issue. The eagerness with which listeners ordered transcripts of the open discussions following the talks indicates the value of this interchange of ideas. Attendance at the meetings ran into thousands.

W. B. McClellan (right) presents new luggage to R. B. Douglas, on his retirement from the presidency, to replace bag Mr. Douglas has used in 54 trips from Montreal to Detroit on Society business.

Hundreds Visit Plants

Four mornings and afternoons a long fleet of buses lined up before Convention Hall to carry hundreds of the out-of-towners to see how other plants do things. ASTE is the largest group ever to tour the RCA Victor plant at Camden, N. J., according to E. A. Dodelin, manager of the company's showroom. Over the week about 500 delegates saw ingenious applications of special and standard types of tools as they inspected the company's television receiver production lines and their assembly and parts fabrication lines.

Yale & Towne's new plant attracted approximately 400 visitors. Highlight of this tour was a working demonstration of the firm's material handling machinery.

Relatively few of the 350 registrants who went through the Westinghouse Steam Division had ever seen so many large machines in action. Most of this machinery was engaged in producing components for power plant equipment. The wide variety of work going through the gear department amazed many of the visitors. In an air conditioned and scientifically lighted gage laboratory, the men saw hundreds of measuring devices used as master checking instruments.

About 300 men visited the Baldwin Locomotive Works at Eddystone to observe the building of diesel engines, diesel electric locomotives, hydraulic turbines, presses and testing machines. Of especial interest was the Reed rolled thread die machine for thread rolling $1\frac{1}{8}$

Here's What They're Saying About the Exposition

Visitors Found What They Wanted . . . "This is the best show I have ever attended"

". . . express my admiration for . . . Cost Cutting Exposition . . ."

"Congratulations on the fine show in Philadelphia"

". . . surprised how complete the show was from cost-cutting standpoint . . ."

Exhibitors Did a Big Business . . . "We hoped to sell one or two machines. We sold our entire exhibit (eight machines) off the floor; some models two or three times"

"We desire to participate in your exposition in Chicago in 1952"

". . . glad that we exhibited . . . more enthusiastic than ever . . ."

". . . benefits of this show can hardly be measured in dollars and cents . . ."

"Most productive five-day show we have ever attended"

"More bonafide buyers and prospects than we have ever encountered at any show"

Attendance Was "Tops" . . . "High quality attendance—you can be sure we will be with you in 1952"

"More genuine interest in the products by knowledgeable people than ever before"

". . . gratified at the 'quality' . . . to whom we demonstrated our products."

". . . unusually high caliber of the large group of visitors. Certainly a group in position to influence the purchasing of industrial products"

The Trade Press Enthuses . . . "The best in ASTE history"—*American Machinist*

"One of the most satisfactory events in the long history of American industrial joint meetings and shows. Met all tests with flying colors . . ."—*Steel*

"Buyers ran the gamut from small shops to large auto plants."—*Iron Age*

"The Tool Engineer—Brains of Mass Production"—*Machinery*

"New production ideas abounded"—*Automotive News*

diameter cylinder head studs, and the ft boring mill used to machine hydraulic turbine parts.

Several busloads of engineers followed the high production operations at Crown Can Co. At the conclusion of the tour company personnel gave a resumé of can making operations and answered questions. Refreshments were served before the ASTE'ers departed.

Other large groups were escorted through The Budd Co., SKF Industries, Link-Belt Co. and the American Pulley Co.

* * *

Thursday evening nearly 1000 conventioneers banqueted in the beautifully decorated ballroom of the Bellevue-Stratford Hotel. A gay and festive atmosphere prevailed from the time the head table guests marched in until the curtain went down on the last act of a floor show that was kept performing for numerous encores.

Ernst, Flanders Honored

After H. E. Conrad, executive secretary, welcomed the party, President R. B. Douglas gave his annual report to the membership. Mr. Douglas also presented a life membership certificate to E. W. Ernst for his contribution to the Society as chairman of the Handbook Committee and, in absentia, an honorary membership award to Senator Ralph E. Flanders, in recognition of "services rendered to the tool engineering profession as well as the high office which he holds in the United States Government." These honors were awarded by the House of Delegates in their meeting that day.

W. H. Smila, senior past president, swore in the newly-elected national officers as reported in the May issue.

Following his installation H. L. Tigges, 1950 president, expressed appreciation for his election and pledged his best efforts to guide the Society towards greater achievements.

A. M. Schmit, a former national secretary from Mr. Tigges' home chapter at Toledo, extended the chapter's pleasure in Mr. Tigges' election and offered good wishes for the entire administration.

Mr. Douglas transferred the president's emblem to his successor and I. F. Holland, another former Society head, presented a life membership and a past president's pin to the outgoing chief executive.

Mashbir Reveals Jap Spy Methods

A U.S. Intelligence officer who scorned the Japanese when they tried to shake hands on arriving for the surrender negotiations was the principal speaker. Col. Sidney F. Mashbir, in giving a forceful account of his long service in unraveling Japanese espionage activities, told how enemy intelligence can ferret out information inadvertently published in newspapers and trade journals.

Touching on the atomic peril, the colonel reminded that everything that is being said about the atomic bomb was said about poison gas after World War I, and when the Chinese invented gunpowder. "If the first use of electricity had been limited to the electric chair, we would have what we see in the atomic bomb today," he reasoned.

Six chapters who had attained their membership quotas for the past year received certificate awards at the banquet. The quotas were based on estimated potentials for individual chapters. Membership gains of the honored chapters were as follows: Springfield, Ill. from 41 to 68, Denver, 74 to 107; Grand River Valley, 66 to 92; Waterloo Area, 122 to 151, Seattle, 67 to 100, and Wichita, 73 to 113.

Others winning honorable mention are Schenectady, Tri-Cities, Houston, Boston, Greater New York and Saginaw Valley chapters.

By-Laws Simplified

Besides the election of officers and other board actions reported in the May *Tool Engineer*, the directors processed 29 by-law amendments prepared in a searching study by the Constitution and By-Laws Committee, under Dick R. Linch, chairman. Most of the changes, proposed to clarify and simplify the by-law structure, were approved by the board, some with further amendments.

The directors also appointed Denham & Co., Detroit, as public relations counsel for the Society.

E. W. Ernst, Handbook chairman, reported that 14,200 of the 15,000 copies of the first printing of the "Tool Engineers Handbook" had been sold and a second printing of 10,000 was being completed for fall publication. In the first six months after publication, he added, the Society had realized a return of one-third of its investment. Corrections of the few errors found in the first printing are available as errata pages on application to Editor Frank W. Wilson at Detroit headquarters.

L. B. Bellamy, national standards

Officers, directors and past presidents line the banquet head table. Annual dinner at the Bellevue-Stratford Hotel was among the Society's best attended and most successful.

Chapter representatives composing house of delegates consider candidates for board of directors.

chairman, received an appropriation to publish a revised and expanded numerical index for data sheets.

H. B. Osborn, Jr., national membership chairman, reported that the chartering of seven new chapters during the year had added 555 members to the roster. Net gain for the year was 360 members.

ASTE groups in Battle Creek-Lansing, Mich., and Long Island City-Garden City, N. Y., are working towards the formation of chapters in those areas.

Winter, Morris Fill Vacancies

Vacancies in the Judicial-Honor Awards Committee, resulting from the recent deaths of J. A. Siegel and R. M. Lippard, will be filled by O. W. Winter and R. H. Morris, the two past presidents next in seniority.

At the house of delegates meeting A. R. Diamond of the host chapter was elected chairman with Monta Cox of Detroit as recorder. President Douglas opened the meeting and Executive Secretary Conrad conducted the election.

Smillie Represents At-Large Group

Anton Peck of Los Angeles, J. M. Johnston of Portland, Me., and J. B. Savits of Boston were chosen as Credentials Committee. Charles Smillie of Detroit was elected delegate-at-large.

Tellers who counted ballots in the election of directors (reported in the May issue) were Joseph Ebner, Milwaukee; Jack Schron, Cleveland; Harry Nelson, Chicago; E. L. Minch, North Texas, and Prof. W. W. Gilbert of the Waterloo Area chapter.

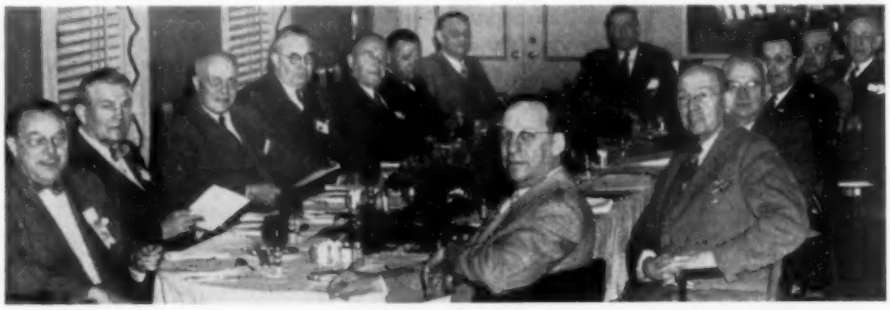
The smoothness which characterized convention activities was largely due to the efforts of the host chapter committee headed by K. W. Riddle. Plant tours, physical arrangements for technical sessions and for the banquet were handled by the Philadelphia group. They also staffed reception desks at convention hotels and at the exposition and helped find accommodations for late-comers.

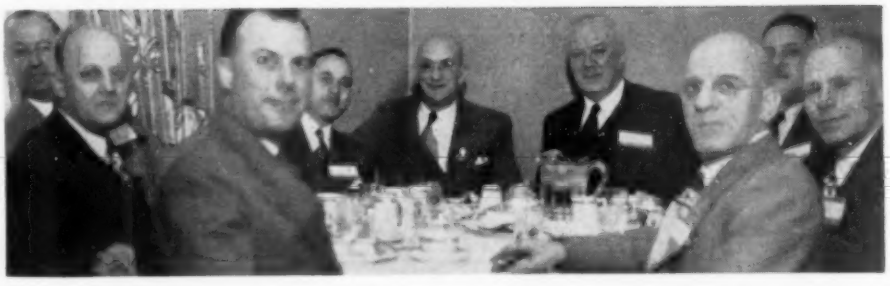
Special Events for Ladies

In order to stretch housing facilities to accommodate the greatest possible number of industrial visitors, women's attendance was not encouraged. But the ladies who did come found wives of local committeemen on hand to welcome them and suggest interesting activities. Organized events included a tour of the Campbell Soup Co. plant at Camden, a fashion show at the John Wanamaker store and sightseeing bus trips.

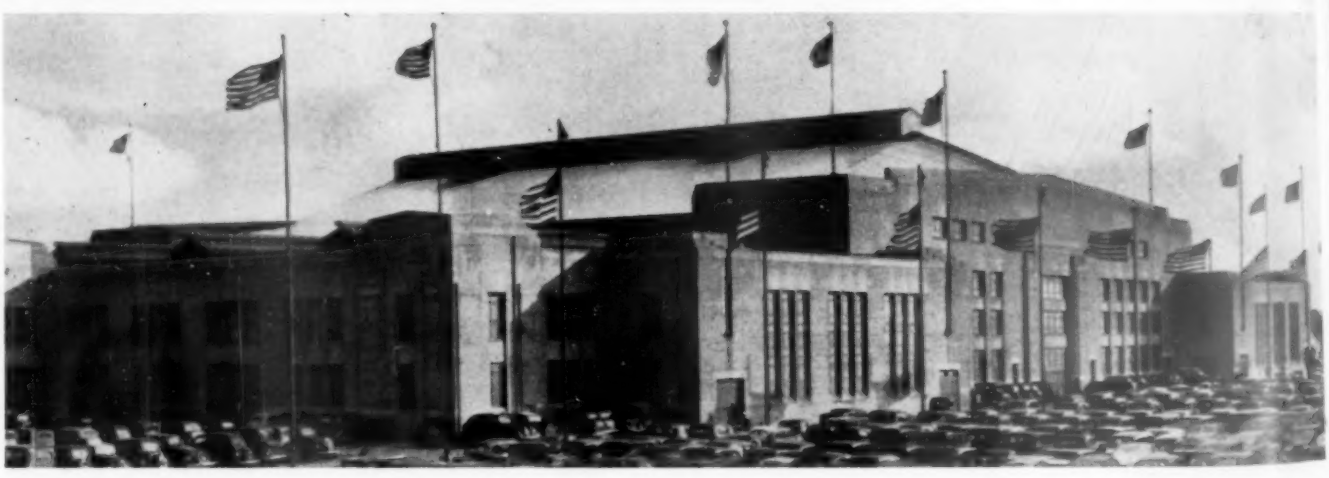
* * *

And so ASTE exposition-conventions continue to be a national institution. With attendance extending far beyond the limits of Society membership, these "all industry" shows perform one of the greatest services any technical society can render to human advancement through the production of more, better and cheaper goods.





Upper: Past presidents of the Society hold their annual luncheon. From left, clockwise around table: C. V. Briner, Cleveland; R. H. Morris, Hartford; F. W. Curtis, Springfield, Mass.; A. H. d'Arcambal, Hartford; W. A. Wagner, T. B. Carpenter and W. H. Smith, Detroit; R. B. Douglas, Montreal, retiring president; H. L. Tigges, Toledo, incoming president; J. J. Demuth, St. Louis, first vice-president; H. E. Conrad, Detroit, executive secretary; I. F. Holland, Hartford; W. B. Peirce, Pittsburgh, and A. M. Sargent, Detroit. Center: Canadian breakfast is another convention institution. At this table are, clockwise from left foreground: L. B. Manning, J. H. Moore, A. C. Wickman of Coventry, England, W. W. Appleton, W. A. Thomas, T. Blair, Ted Mabee, R. S. Hamilton and J. W. Lengbridge. Bottom: Chicago Amphitheatre will be scene of Society's '52 show.



Utah T. E.'s Form Chapter; Long Beach and Allentown Chartered

WITH THE chartering of three new chapters in less than two months, Society membership has been swelled by 249. One chapter—Salt Lake City, Utah—opens up an area new to ASTE. The others—at Long Beach, Calif., and Allentown, Pa.—represent expansions of Society service in established industrial sections.

The Utah group met March 31 at the Newhouse Hotel for their charter night. Frederick Preator, temporary chairman, introduced Arthur D. Lewis, ASTE director from Los Angeles, Calif. After outlining the Society's aims and functions, Mr. Lewis conducted an election of officers.

The officers are: Chairman, Leslie C. Seager, tool engineer, Eimco Corp.; first vice-chairman, Harry J. Todd, supervisor, machinery department, Mine & Smelter Supply Co.; second vice-chairman, Frederick Preator, professor of engineering, Utah State Agricultural College, Logan; secretary, John F. Woodhead, sales manager, The Galigher Co.; treasurer, William J. Bullough, tool engineer, Eimco Corp.; delegate, L. C. Seager, and alternate, John R. Stevens, general superintendent, Eimco Corp., all of Salt Lake City.

Chairman Seager accepted the charter from Mr. Lewis, then presented the guest speaker, Dr. William M. McPhee, professor of sociology, University of Utah.

Emphasizing the trend of industry, Dr. McPhee stated that half of all the new plants being constructed in the United States are going up in southern and western states. Where new and better equipment is installed in old plants, he pointed out, there is little migration; but when old plants are replaced with new factories in a different area, migration is speeded up.

Engineers Can Aid Development

Industrially undeveloped, Utah formerly specialized in extracting minerals. As processing and manufacturing operations increase, the engineering profession will assume greater importance, Dr. McPhee observed.

A handbook signed by everyone present was given to the chairman to be awarded to the member bringing in the most new members during a given period. Charter membership is 54.

* * *

The 80 charter members of Long Beach chapter were welcomed to the Society in a ceremony held April 5 at Knotts Berry Farm, Buena Park, Calif. Delegations from Los Angeles and San Diego chapters were present to extend good wishes.

Director Lewis presided at this chartering and installed as officers: Chairman, John H. Stansbury, tool designer, and first vice-chairman, Glenn V. Wilkinson, assistant supervisor of tool design, Douglas Aircraft Co.; second vice-chairman, Daniel J. MacLean, chief tool designer, Axelson Mfg. Co., Vernon; treasurer, Harold F. Robinson, tool designer, Douglas Aircraft; secretary, Arthur J. Thomas, president, S. M. Equipment Co., Los Angeles; delegate, J. H. Stansbury; and alternate, E. J. Van Wagner, supervisor of tool design, Douglas Aircraft.

H. G. Bartling, John Morgan, E. C. Baldwin and Vincent Kearns served as tellers in the preceding election. Mr. Lewis and Dick R. Linch of Los Angeles, national constitution and by-laws chairman, explained the purposes, procedures and advantages of ASTE to the 91 members and guests attending the dinner meeting.

Founded by Small Group

Formation of the chapter resulted from the organization efforts of J. H. Stansbury, G. V. Wilkinson, H. F. Robinson and Horace Wolff of Douglas Aircraft Co. Mr. Stansbury and Mr. Robinson served as temporary chairman and secretary, respectively, while Mr. Lewis and Mr. Linch assisted and guided the engineers in the groundwork.

* * *

Largest of the new groups was chartered February 17 at the Traylor Hotel, Allentown, Pa. The 115 tool engineers comprising this chapter will be known as Lehigh Valley chapter.

Harry E. Conrad, executive secretary of the Society, presided during the election of the following officers: Chairman, Eugene Pellizoni, superintendent, Mack Mfg. Corp.; first vice-chairman, George

Upper: Six West Coast members take their oaths as charter officers of a new chapter at Long Beach, Calif. From left: J. H. Stansbury, chairman; G. V. Wilkinson, first vice-chairman; D. J. MacLean, second vice-chairman; A. J. Thomas, secretary; H. F. Robinson, treasurer; E. J. Van Wagner, alternate, and A. D. Lewis, national director from Los Angeles, installing officer. Lower: Officers heading new ASTE chapter at Salt Lake City are, from left: W. J. Bullough, treasurer; H. J. Todd, first vice-chairman; L. C. Seager, chairman and delegate; Frederick Preator, second vice-chairman; J. F. Woodhead, secretary; and J. W. Stevens, alternate.

Other News in This Issue

Chapter	Page
Baltimore	63
Boston	62
Cedar Rapids	61
Chicago	66, 90
Cleveland	60, 67
Dayton	65
Detroit	58, 60, 63
Elmira	65
Erie	62
Evansville	60, 64
Fond du Lac	67
Hamilton	68
Houston	66
Kansas City	67
Los Angeles	66
(Minneapolis) Twin Cities	60, 68
(Moline) Tri-Cities	67
Muncie	61
New Haven	67
Peoria	60
Philadelphia	60, 62, 64, 65
Pittsburgh	64
(Poughkeepsie) Mid-Hudson	61
(Providence) Little Rhody	58
Racine	58, 67
Richmond	67
Rochester	60, 66
Rockford	60, 64
(San Francisco) Golden Gate	60, 67
Seattle	61
South Bend	90
(Springfield, Vt.) Twin States	62, 65
(St. Charles, Ill.) Fox River Valley	67
St. Louis	58
(Utica, N. Y.) Mohawk Valley	60, 61
(Washington, D. C.) Potomac	64
Windsor	65
(Winston-Salem) Piedmont	61
Worcester	58, 90
Coming Meetings	68
Obituaries	68, 91
Our Society	63
Situations Wanted	90

* * *

Chapter listings include member as well as meeting news.

C. Evanson, manufacturing engineer, General Electric Co., Allentown; second vice-chairman; James R. Fairhurst, supervisor, Ingersoll-Rand Co., Phillipsburg, N. J.; secretary, Albert B. Carney, president, Carney & Assoc., Ltd.; treasurer, Ernest A. Kromer, tool designer, Western Electric Co.; and delegate, George D. Fritch, vice-president, Bonney Forge & Tool Works, Allentown.

Robert B. Douglas of Montreal, retiring president, traced the growth of the Society and welcomed the chapter. After swearing in the new officers, he presented the charter and asked the entire membership to sign it.

Thomas J. Donovan, Jr., of Philadelphia, a national director, presented the chairman pin to Mr. Pellizoni. Dr. Harry B. Osborn of Cleveland, national membership chairman, also spoke briefly on the history and aims of the organization.

Detroit T. E.'s Sponsor Carbide Lecture Series

Detroit, Mich.—A series of special educational meetings on the latest developments in industrial applications of carbides is being sponsored by Detroit chapter. Bennett Burgoon, Jr., district manager of Kennametal, Inc., is chairman of the committee in charge of this activity.

George Eglinton, vice-president, Lincoln Park Industries, Lincoln Park, Mich., gave the first lecture May 4 at the Rackham Building. His paper, "Carbide Die Developments," presented earlier at the ASTE Philadelphia convention, was published in the April *Tool Engineer*.

More than 150 men attended this meeting. The active question and answer period which followed was indicative of the interest among carbide engineers.

The second carbide lecture is scheduled for the regular chapter meeting, June 8. It concerns "The Place of Carbides, Cast Cutting Alloys, and High Speed Steels in Industry." Carl J. Oxford, chief engineer, National Twist Drill & Tool Co., Rochester, Mich., heads a panel of eight experts in these fields.

Other panel members are: Fred Bohle, chief engineer, and E. D. Wiard, district manager, Illinois Tool Works; John C. Gibson, carbide engineer, Pratt & Whitney; L. H. Goddard, vice-president, Goddard & Goddard Co.; J. H. Horrigan, chief engineer, Union Twist Drill Co.; Leo W. Reuland, production manager, Small Tool Div., Barber-Colman Co.; and Earl Wennerstrom, chief engineer, Weldon Tool Co.

After a summer recess the series will be resumed in September, with meetings the third Thursday of the month. Through this program the chapter aims to help the engineer specializing in carbides to better serve industry.

Schnitzer Now R.P.E.

Providence, R. I.—Ernst Schnitzer of Little Rhody chapter, ASTE, has been licensed as a Registered Professional Engineer in the State of Rhode Island.

Show Publicity Pleases New National Officers

Reading from the hundreds of press clippings commending the Society's Industrial Cost-Cutting Exposition at Philadelphia are, from left seated: W. A. Thomas, assistant secretary-treasurer; H. L. Tigges, president, and J. J. Demuth, first vice-president; standing: W. B. McClellan, secretary, and H. E. Conrad, executive secretary. At right is A. F. Denham, public relations counsel.

Surprise Program Takes Racine to Wire Plant

Racine, Wis.—Racine chapter pulled off a mystery program when 90 members and friends met April 3 at the Manufacturers Association Building.

From the advance publicity the group expected a lecture on "Modern Wire Production" with some sort of demonstration.

After dinner, Chairman George F. Tigges introduced Raymond Diehl and Arthur Lutter of the American Steel & Wire Co. Then the audience was asked to don hats and coats and leave the building. Outside, waiting buses whisked the group to the American Steel & Wire plant at Waukegan, Ill.

At the plant the engineers were led along the rolling and processing of steel rods to wire drawing, straightening and cutting. They passed through the galvanizing, spring coiling, stranded wire, heat treating, inspection and shipping departments into the maintenance shops and the refinishing of wire drawing dies in the die room.

Top Flying Peril Is Cab To Port, Says Jet Pilot

St. Louis, Mo.—The most dangerous part of flying is the ride to and from the airport, according to a jet test pilot with more than 2400 jet flying hours to his credit.

As guest speaker at St. Louis chapter's first father and son night, April 6, Lt. Col. Howard T. Markey thrilled 158 tool engineers and their youngsters with accounts of some of his flying experiences, as well as his non-technical explanation of jet propulsion.

The officer who flew the first Army Air Corps jet plane to Alaska in 1944 contends that he knows nothing about "flying saucers." After discussing the origin of jet planes, engine principles and performance records, the colonel talked about rockets and showed films on these subjects.

Wagner Forms Eng'g Firm

Detroit, Mich.—After 30 years as general master mechanic of the Lincoln-Mercury Div. of Ford Motor Co., Walter F. Wagner has established his own business.

The new firm, located at 16807 Grand River Ave., is known as Wagner Engineering Co. Services will include consulting, estimating, processing and planning, product engineering, plant layout, special machine design, and tool, jig, fixture and die designing.

At the start of World War II, Mr. Wagner was sent to Europe on the Rolls-Royce engine project. Subsequently he took over the tooling for the Ford tank engine, and later participated materially in the tooling program at the huge Willow Run bomber plant.

A past president of ASTE, Mr. Wagner is a Registered Professional Mechanical Engineer.

OFFICERS INDUCTED—Upper: At St. Louis, R. B. Douglas, retiring president, swears in: Emil Stempfle, chairman; L. W. Greenblatt, first vice-chairman; E. P. Huchzermeier, second vice-chairman; H. G. Oberle, secretary, and William Bachman, treasurer. Below: Worcester officers are installed by Past President F. W. Curtis. Officers, from left: C. D. Schofield, delegate; C. L. Morse, chairman; Bernard Szarek, second vice-chairman; John Rotchford, secretary, and E. R. Lundquist, treasurer.

Want More ASTE Data Sheets?

Here's How You Can Help Us Get Them For You

WAS IT in the slick catalog with the blue varnished cover, or the red spiral bound job? Or maybe that thin tan book with the hard back?

Aggravating isn't it to try to locate a half-remembered catalog of tooling units. A catalog containing just the data you need for the job at hand.

Odd sizes and formats of manufacturers' literature keep many catalogs out of your file. They sprawl haphazardly over bookshelves, tables, desks and drawing boards. Some even slide ignominiously into the "permanent file." Too bad that such valuable and expensively compiled information should be wasted. All for lack of standardization.

Not so with the ASTE data sheet book. Here, information on similar tools made by different manufacturers is filed consecutively for easy comparison. Each sheet is readily accessible through a numerical and alphabetical cross index. Data sheets are uniform in size, format and reproduction. The engineer can study tools and accessories on their actual merits. He can visualize an item from the illustration. He can transfer specifications to drawings, and indicate exactly what should be purchased.

When the ASTE National Standards Committee issues new sheets, the punched pages can be added to your loose leaf binder under their respective classifications. Revisions can be inserted and old sheets discarded. This eliminates thumbing over or specifying obsolete material.

The Society's cooperation with manufacturers on this project is one of ASTE's greatest contributions to industry. It saves time, money, effort and material in tooling up today's goods.

Since the ASTE numerical index was adopted four years ago, 332 pages of data sheets have been issued to the membership. The latest distribution of 36 pages has just been completed. The next, expected to include from 50-60 pages, will be out in September. Companies participating in this mailing are: Mueller Engineering Co., Shell Oil Co., Siewek Tool Co., Boyar-Schultz Corp. and Verson Allsteel Press Co.

But there are hundreds of manufacturers not among our data sheet suppliers who could be benefiting through this service—if they knew definitely that tool engineers preferred such a presentation. Others whose stocks of sheets are exhausted would reissue them if they knew which of their products you need information on most.

Check Over Exhibitors' Listings

Here's how you can help your Standards Committee expand your supply of data sheets. Check over your present file of sheets and jot down other products you specify in your work, along with the manufacturers' names.

To simplify the job, use your April Exposition issue of *The Tool Engineer*. Turn to Page 86 where the product classification listing of exhibitors at the 1950 Philadelphia show begins. Each item has a numerical identification corresponding with the data sheet index and each company is cross-listed alphabetically with a detailed list of products. While there are more than 325 exhibitor companies covering nearly every phase of tooling, you may think of others with products for which you would like data sheets prepared.

List your selections in the coupon on this page. If your list is extensive—and we hope it is—continue it on a plain sheet.

Mail the coupon at once so that your Standards Committee can go to work on it. They'll contact manufacturers of the most frequently requested items and suggest cooperating in this service to industry to offset high labor costs.

It won't take much of your time, but it may bring you help to advance you on your job, to make your department more efficient and your company more prosperous. Do it today!

I Need ASTE Data Sheets on These Products:

Item	Manufacturer

If you need more space, continue your listing on a plain sheet. Mail the coupon or a facsimile to: Mr. L. B. Bellamy, National Standards Chairman, American Society of Tool Engineers, 10700 Puritan Ave., Detroit 21, Mich.

Name ..... Chapter .....

Address .....

New Chapter Officers Begin 1950-51 Administrations

Extreme right column: W. H. Logue, 2nd v.-chm.; congratulates R. W. Bayless on his election to chairmanship of Peoria chapter. From left: Mr. Logue, V. W. Schellschmidt, treas.; D. H. Brighton, 1st v.-chm.; Mr. Bayless, and D. I. Hartter, secy. Also elected but not shown is H. E. Schmidt, delegate. Center strip below, from left: Past Chairman F. V. Snodgrass inducting Golden Gate officers: I. S. Minetti, chm.; G. B. Berlien, 1st v.-chm.; T. J. Rohrer, 2nd v.-chm.; David Gustafson, secy., and Paul Pick, treas. Right: Cleveland officers being installed: H. B. Osborn, Jr., chm.; Robert Southwell, 1st v.-chm.; Andrew Clark, 2nd v.-chm.; Lloyd Sahley, secy.; and Warren Fitzsimmons, treas.

Top, left: Emil Kitzman (right), retiring chairman, introduces winners in Philadelphia chapter election. From left: L. S. Paulsen, chm.; K. W. Riddle, 1st v.-chm.; W. J. Griffith, 2nd v.-chm.; A. B. Lueck, secy; F. J. De Frates, treas.; A. R. Diamond, delegate; and H. W. Gross, alternate. Center: Taking oath at Mohawk Valley chapter, from left: F. L. Barker, chm.; A. K. Schroeder, 1st v.-chm.; A. C. Delmont, 2nd v.-chm. and delegate; P. K. Lyman, secy; Director T. J. Donovan, Jr., reading oath, and E. J. Masucci, alternate. Bottom: Rochester officers, from left: William Auer and J. C. Lawrence, directors; G. E. Cobb, treas.; William Gordon, advisory; N. H. Fowler, secy.; K. A. Schmidt, director; J. O. Horne, 1st v.-chm.; E. W. Moore, chm.; and H. O. Simon, past chm., conducting installation.

Right, upper: Evansville officers, from left: Herman Straus, alternate; Charles Thuman, 1st v.-chm.; Henry Pernicka, secy.; Walter Stippler, chm.; Walter Schneider, delegate; Roman Wannemueller, 2nd v.-chm., and Paul Vierling, treas. Center: R. B. Douglas, retiring president, congratulates Detroit officers as he inducts them. From left: John Wagus, treas.; Andrew Grant, secy.; John Darron, 2nd v.-chm.; Douglas Anderson, 1st v.-chm.; and Charles Smillie, chm. Bottom: Twin Cities officers and committee chairmen, from left: C. E. Fasth, secy.; Clifford Lofdahl, alternate; P. S. Tobias, 1st v.-chm.; Joseph Duncanson, editorial; L. C. Blanchar, chm.; E. J. Skramstad, membership; L. E. Overholt, constitution and by-laws; J. W. Schwartz, education; P. A. Saari, treas.; D. A. Reiner, 2nd v.-chm.; W. F. Sahlin, delegate; and R D. Framstad, public relations. Bottom, left: George Johnson, former national officer, installs Rockford officers, from left: Ernst Norrman, secy; John Rice, treas.; William Moreland, 3rd v.-chm.; Bruce Lundgren, 2nd v.-chm.; George Torrence, 1st v.-chm., George Rigeman, chm.

Seattle Sponsors University of Washington Lectures

Seattle, Washington—The Education Committee of Seattle chapter has been conducting a series of educational lectures by teachers from the University of Washington. The series consisted of five lectures on "Ferrous Metals," under the joint direction of Education Chairman Professor Karl Moltrecht of the U. of W. department of mechanical engineering and Program Chairman Harold Pinkerton.

Over 100 members and guests attended the first lecture, "Definition of the Physical, Static and Dynamic Properties of Ferrous Metals." Professor Blake Mills of the university's mechanical engineering department was the speaker. His talk followed the regular business meeting and dinner, April 11, at Hotel Gowman.

Draws Stress-Strain Curves

Professor Mills, in addition to his scheduled lecture, devoted considerable time to discussing machine design in relation to engineering materials. He elaborated with blackboard demonstrations of typical stress-strain curves. Interest ran high during the ensuing question and answer period.

James Smith, chapter chairman, expressed the appreciation of his fellow members and paid tribute to the university teachers contributing to ASTE activities.

Orville Decker, membership chairman, and Joseph Gembolis, vice-chairman, were recognized for their efforts in meeting the membership quota. Seven new members were formally welcomed.

Harold Pinkerton, retiring chairman was presented with a past chairman's pin by Mr. Smith, his successor.

Poor Lathe Work Runs Into Millions–Murray

Poughkeepsie, N. Y.—Poor turret lathe practice is costing industry hundreds of millions of dollars, E. L. Murray, sales promotion manager, The Warner & Swasey Co., Cleveland, Ohio, told approximately 50 members and guests of Mid-Hudson chapter. Mr. Murray made this statement during a lecture, "Fundamentals of Turret Lathe Practice," given April 13 at a chapter dinner meeting at the Nelson House.

A motion picture illustrating cutter action and chip flow augmented Mr. Murray's talk, reported in earlier issues of *The Tool Engineer* by other chapters who have sponsored this program.

Coffee speaker was Irving Merrick, chief of the Poughkeepsie Fire Department, who discussed "Tools for Fire Fighting." Mr. Merrick pointed out how tool engineers have helped firemen by implementing lighter and more durable equipment.

Guests included: Frank Adams, Edmund Van Brunt, George Wallas and Charles Brady from V & O Press Co., Hudson; M. A. Kurkhill and M. B. May, Tiffany Steel & Metal Products, Inc., Poughkeepsie; and J. J. Smith of the Ohio Knife Co., Cincinnati, Ohio.

Other lectures in the series were scheduled as follows: April 18—"Structure, Composition, Thermal Treatment, Hot and Cold Working of Alloy Steels," and April 25—"Structure, Composition, Thermal Treatment, Hot and Cold Working of Carbon Steels," presented by a Mr. Finley of the school of mineral engineering; May 2 and May 9—"Design," with Professors Day and Cooper of the department of mechanical engineering as respective speakers.

Through these lectures the chapter is serving not only its members, but engineering students and industry in general.

Urges More Productivity, Scores Partisan Politics

Cedar Rapids, Iowa—"Is the American System Worth Saving?" Ross N. Young, editor of the *Marion Sentinel*, debated this question as guest speaker at Cedar Rapids chapter, April 19.

Mr. Young warned against the growing trend toward socialism in the past 30 years. He advocated voting for the man rather than a straight party ticket, and urged greater productivity to maintain a high standard of living. A lively discussion period followed.

Committee chairmen for 1950 were announced as follows: John Wright, constitution and by-laws; Darwin Tharp, editorial; Kenneth Fergusen, education; Woodrow P. Thompson, membership; A. T. Ronk, public relations; R. F. Brombaugh, standards; and Carroll Bryant, photography.

Guests and out-of-town members included: Thomas H. Houke, production manager, Chandler Machine Products; C. M. Basile, vice-president, and Dwight L. Allen, Link-Belt Speeder Corp.; J. Arthur Young, Hawkeye Sheet Metal Co.; and Harley Westphal, foreman Turner Co., all of Cedar Rapids; Otto Schoitz, general manager, and Joseph G. Robinson, tool engineer, Schoitz Engineering Works, Waterloo.

Slides Reveal Causes Of Steel Failures

Utica, N. Y.—Mohawk Valley chapter presented a program on "Cause and Prevention of Common Tool Failures," April 25, at the Moose Home. Approximately 50 members and several guests attended the meeting.

Fred Barker, chapter chairman, presided and introduced R. A. Gleason, district sales engineer for Latrobe Electric Steel Co., Latrobe, Pa. After a brief talk, Mr. Gleason introduced the main speaker, Dr. Stewart G. Fletcher.

In his lecture Dr. Fletcher used slides to more clearly emphasize failures in steels caused by fractures within the billet, heat treatment, poor design, improper grinding and wrong selection of steel for a particular purpose. Modern methods of detecting failures also were discussed. A question and answer period followed.

Ray Kohl, eastern sales manager for Latrobe, was a guest.

Southern Branch Plants Use Quality Control

Winston-Salem, N. C.—Piedmont chapter learned how a national manufacturer handles the flow of material through a plant, when G. A. Muller, assistant superintendent of quality control engineering for Western Electric Co.'s North Carolina plants, and C. W. Walter, assistant superintendent of inspection at the Winston-Salem branch, talked on "Control of Quality in Manufacturing."

The two engineers were guest speakers at a dinner meeting held April 17 at Bliss Restaurant, Greensboro. They were introduced by A. F. Moosbrugger, first vice-chairman.

Demonstrates with Flow Chart

Mr. Walter pointed out on a chart the flow of work from raw material to finished product. Illustrating with slides, Mr. Muller detailed the method and percentages employed in quality control to determine whether a product is acceptable.

Following an open discussion on the speakers' talks, J. S. Longdon, sales representative of Federal Products Corp., Providence, R. I., showed a sound film, "Dial Test Indicators and Gages."

C. J. Rix, second vice-chairman, announced a dinner dance planned for the third week in June.

J. D. Schiller, chapter chairman, presided over a business meeting prior to the technical session and reported on his visit to the ASTE exposition at Philadelphia. Other members called on to express their impressions of the show included S. B. Jeffreys, secretary; Mr. Moosbrugger, and Philip Corbeels of Western Electric Co., Burlington. All were enthusiastic about the exhibits and the operation of the exposition.

Industry Lends Resources To Build Iron Lungs

Muncie, Ind.—How industry is using its mechanical ingenuity to help relieve suffering humanity was related by Court Rollins, speaker at the April 4 meeting of Muncie chapter at the YMCA.

Mr. Rollins, who is welfare director for Warner Gear Co., told how six iron lungs were constructed locally in five days during the polio epidemic of last summer. During the scourge Miss Nellie Brown, superintendent of Ball Memorial Hospital, expressed the need of such equipment to John Reichert of Excell Electric Co. A developer of ideas and an inventor, Mr. Reichert enlisted the aid of Mr. Rollins and others to produce an efficient lung.

Through mutual cooperation, trial and error, an effective and inexpensive device was turned out. A set of drawings, material list, instructions for assembly and operation, made by Warner Gear Co., are furnished in response to inquiries received from all over the world.

In conclusion Mr. Rollins complimented the Society on its ability to interchange ideas.

Anti-Friction Bearings Smooth Everyday Life

Springfield, Vt.—" In normal, everyday life you're always within 50 feet of an anti-friction bearing," C. L. Eastburg, assistant chief engineer, Railway Div., Timken Roller Bearing Co., Canton, Ohio, told a Twin States chapter audience. Mr. Eastburg lectured on "Industry and Anti-Friction Bearings" at a meeting, April 19, at the Windsor House, Windsor.

Developing the background of the bearing industry, Mr. Eastburg recalled that the first ball bearing was patented in England in 1794. The first known roller bearing was found in a church weathervane at Lancaster, Pa., in the early 1800's. Bicycles were equipped with ball bearings about 1900, but the big boom in bearings came with the automobile.

Going on to railway car applications, the speaker cited availability for service—eliminating "hot boxes"—and time saved on goods in transit as prime reasons for anti-friction bearings in rolling stock. Illustrations, comparative statistics and an animated film cartoon, 'Big Tim," pointed up his remarks.

Program chairman F. J. McArthur introduced Mr. Eastburg.

Announces Committeemen

In a business meeting preceding the technical session, chairman H. H. Ranney announced appointment of the following committee chairmen: George Pratt, education; Harold M. Noyes, public relations; William Hebert, editorial; William Piper, entertainment; William Farrell, constitution and by-laws; Geno Lucarini, standards; Cyrus H. Hoisington, membership; and F. J. McArthur program.

Mr. McArthur and Chairman Ranney read their reports as delegates to the Philadelphia convention and exposition.

C. Jenness Cameron of Lovejoy Tool Co., a show exhibitor, suggested that the chapter congratulate Philadelphia chapter on its fine work as convention host.

Out-of-town guests came from Boston and Springfield, Mass.; Albany, N. Y.; Canton, Ohio; and Weisbaden, Germany. They included a Mr. Burkhardt, representing the Stenzel Co. in Weisbaden, who is in the United States to learn about American-made machines sold through his firm in Germany.

Diamond Is V.P.

Philadelphia, Pa.—Arthur R. Diamond, formerly special representative for Jackson-Walter Co., has joined Tools, Inc., Ardmore, as vice-president, the firm of manufacturers representatives and engineers has announced.

Educated at the University of Pennsylvania, Mr. Diamond served as chief tool designer at Kellett Aircraft and as mechanical engineer at The Budd Co. before joining Jackson-Walter four years ago.

He was a member of the Philadelphia ASTE chapter committee for the Society's exposition and convention there last month, is chapter delegate and a member of the National Education Committee.

Metallurgist Can Help Reduce Grinding Costs—Tarasov

Boston, Mass.—Knowledge of steel content can reduce grinding costs, Dr. Leo P. Tarasov, metallurgical engineer of the Norton Co. Research Laboratories, emphasized while lecturing on "Some Metallurgical Aspects of Grinding" before Boston chapter. Dr. Tarasov was the technical speaker at a meeting held April 6 at New England Mutual Hall.

Stressing the help a metallurgist can give to the tool engineer, Dr. Tarasov began his talk by discussing the grindability of tool steels. He cited results of a number of tests to prove his points. The higher the chrome content of a steel, the harder it is to grind. This is true to a more marked degree with vanadium, he added.

Complex alloys, the speaker showed, have from 50 to 100 percent harder carbide particles with correspondingly higher production costs for grinding. Quenching medium seemingly has no bearing on grindability. But for rough grinding where a great deal of metal must be taken off in one pass, hardness of the steel should be between 30 and 40 Rockwell C.

Dr. Tarasov continued his slide-illustrated talk with his findings in trouble-shooting situations. Steels sensitive to grinding, he stated, develop strains that show up as cracks during heat treatment.

James Leone, chapter chairman, presided over the meeting and Henry Hudson of Vanadium-Alloys Steel Co. introduced the speaker.

Approximately 120 members and guests were present for a dinner preceding the meeting, with 20 more coming to hear Dr. Tarasov. A color film travelog concluded the program.

* * *

One of the chapter's most gala functions combined a tenth anniversary celebration with ladies night and installation of officers.

Held March 10 at Hotel Puritan, the festive dinner party began with a reception for the 170 members and their ladies attending the affair. Dinner followed with a brief interlude of dancing.

Joseph P. Crosby, chairman, introduced V. H. Ericson, national director from Worcester, who swore in new chapter officers as follows: A. J. Leone, chairman; Prof. Prescott A. Smith, first vice-chairman; Harold L. Seekins, second vice-chairman; Salvatore Gianino, secretary; and Karl G. Nowak, treasurer.

Mr. Ericson then presented a past chairman pin to Mr. Crosby. The retiring chairman responded, commenting on the year's activities and accomplishments and thanking his officers and committeemen for their cooperation.

After a brief acceptance speech, Mr. Leone, the incoming chairman, introduced his committee appointees. A floor show and dancing rounded out the evening.

Wives of Boston chapter officers saw them installed at annual ladies night. Standing, from left: Joseph P. Crosby, retiring chairman; A. James Leone, chairman; Harold L. Seekins, second vice-chairman; Salvatore Gianino, secretary; Karl G. Nowak, treasurer, and Prof. Prescott A. Smith, first vice-chairman. Seated: Mrs. Leone, Mrs. Nowak, Mrs. Smith, Mrs. Crosby, Mrs. Seekins and Mrs. Gianino.

Tool, Plastic Engineers Inspect New Power Plant

Erie, Pa.—For their first joint meeting the Erie ASTE chapter and the Northwestern Section of the Society of Plastic Engineers toured the Pennsylvania Electric Co.'s new power plant at Warren, April 4.

Stanley Sadoski, ASTE chairman, opened the preceding dinner meeting at the Carver Hotel and introduced Gerald Stokes, chairman of the Plastics Engineers, and E. G. Garber, office manager of Pennsylvania Electric Co. Mr. Garber presented K. R. Williams, chief engineer, who outlined the tour and the plant history.

The 70 engineers making the tour were impressed with the size and cleanliness of the coal-fired, steam generating plant.

Robert Williamson, manager of the Railroad Rolling Stock Div., Erie General Electric Works, traced the progress of gas turbines as applied to electric locomotives, when the chapter met May 2 at Gannon College.

Mr. Williamson augumented his talk with slides and conducted a lengthy question and answer period at the conclusion of the program. He substituted for C. B. DeVlieg, a speaker on jig mill technique, who had been unexpectedly hospitalized.

Archie Weingard, chapter delegate, reported on the national convention at Philadelphia.

Ten guests and two new members were introduced and welcomed. There was an attendance of 52 for the meeting and preceding dinner in the Commons Room.

Detroit Initiates Series Of Student Programs

Detroit, Mich.—To help train the tool engineer of tomorrow, Detroit chapter is planning a season of student lectures. Education Chairman Stanley Phillips, vocational director of Wilbur Wright Vocational High School, heads the project.

Participating schools, comprising the chapter's student membership, are: Detroit College of Applied Science, Lawrence Institute of Technology, University of Detroit, Wayne University, Acme School of Die Design Engineering and Wilbur Wright Vocational High School.

Wilcox Talks on T. E. and Teens

The first central meeting of the junior section, held April 20 at the Engineering Society of Detroit, featured a recording of an address by Grant S. Wilcox, Jr., a former director. Mr. Wilcox's talk, "Tool Engineering and the Teen Ager," was originally given at the chapter's recent father and son night. Two General Motors films, "Engineering Through the Ages," and "Modern Diesel Power," also were presented to the approximately 60 students attending.

The Lawrence Institute of Technology group was in charge of the program. Each month one of the remaining schools will take over a meeting. After the June lecture there will be a summer recess until September.

Subjects include: "Hobs and Hobbing Practice," "Art of Generating Gear Manufacturing Equipment," "Modern Gaging Practice," "Tool and Die Welding," "Powder Metallurgy," "Forging Die Design," and "Alloy Steels."

Bastian Reports Research Findings on Lubricants

Baltimore, Md.—Importance of lubricants to the tool engineer was emphasized to Baltimore members attending a chapter dinner meeting April 5. E. L. Bastian, lubricants staff engineer of the Shell Oil Co., reported his company's findings on cutting, drawing, and grinding lubricants and their applications.

After a question period, refreshments were served to the approximately 60 members and guests present.

Earlier in the evening A. P. Ohler, president of the Ohler Mfg. Co. discussed unusual and unique die designs originated by his company, and the attendant difficulties. Finished products resulting from the solution of these problems were exhibited by the speaker.

* * *

In a brief but impressive ceremony T. J. Donovan, Jr., national director from Philadelphia, installed the chapter's new officers, March 31.

The officers are: R. D. Brickett, chairman; Anthony Taomina, first vice-chairman; John W. Schukraft, second vice-chairman; Charles Janus, secretary; and Herbert Middlestadt, treasurer.

Immediately following the installation, the Entertainment Committee, headed by Hugo Coelius, presented an entertainment program to an audience of approximately 500 members and guests.

OUR SOCIETY

By Harry E. Conrad

There's an old saying that "once anything happens in New England, it becomes tradition." That certainly goes for "Connecticut Night."

Connecticut Night was inaugurated in 1949 at Waterbury. This year's affair was held at Stamford—that is to say, the final event was at Stamford. Daytime plant tours took place at Conde-Nast Publications, Electrolux Corp., Machlett Laboratories, Chas. H. Phillips Co., Pitney-Bowes, Schick, Inc., and Yale & Towne Mfg. Co.

A technical session was ably presented by ASTE'er Payse Blanchard of the Bullard Co., and a better than ever banquet was held in the dining room of Pitney-Bowes Co. with a better than ever talk by another member, William A. Purtell, president of the Holo-Krome Screw Corp., Hartford.

Truly an ASTE dominated affair, of which the Connecticut Night Committee can be proud. Hats off to the participating chapters and their members.

The impact of these meetings and the good to be derived by New England industry will be recognized and the tradition of "Connecticut Night" perpetuated.

Other Chapters Could Emulate

Incidentally, the Connecticut chapters do not have a copyright or patent on the idea. What's good for Connecticut could be good for other parts of the country.

After all the preparation for the convention and exposition, plus two weeks of animated suspension in Philadelphia of trying to be in eight different places at the same time, the mere mention of the words "convention" or "exposition" threw all of us here at headquarters into a state of exhaustion.

Now that we have our "second wind," so to speak, I would be amiss if I didn't sincerely thank everybody who helped make this a most successful affair. I wish we had space to reprint the many letters of commendation we have received.

We have a lot of letters from exhibitors, some from visitors, and one of which we are all particularly proud—a congratulatory note from the Twin States Chapter No. 40. In our book at headquarters, a letter of commendation from a chapter is a real feather in our caps. Hope we don't get too cocky about it.

I haven't seen the House of Delegates meeting minutes yet, but understand that they, too, have expressed words of praise. In all humility, I assure you that we are deeply grateful. Thanks a million. It's a real pleasure to know that we have served you satisfactorily.

We have another letter which I must share with you because it exemplifies the ASTE spirit. Identifying names are necessarily omitted but the significance remains.

> On the first day of last February, I wrote to you indicating that I wished to tender my resignation from the ASTE. This letter was written at a time when I had reached a personal conclusion that ASTE as a representative engineering society for the tool and machine design engineer left entirely too much to be desired. I had watched my chapter disintegrate and, in my opinion, lose sight of the purpose and aims for which some of us here have striven so hard.

Sat Back and Criticized

> Since receiving your reply which, I must sincerely admit, called my shot, I have done some reflecting and I realize a simple truism. That is: this Society cannot be any better than the members behind it; if there are many members thinking as I had been, there is certainly good reason for the idea to flop.
>
> I cannot honestly say just what my chapter is doing for I have sat back and mentally criticized our programs for the past year and have not summoned sufficient interest to attend a meeting or even make the acquaintance of our present officers.
>
> I do have a number of skeletons in my closet of memory of the business transactions of my chapter, which left a bad taste in my mouth. Quite naturally they stirred some unpleasant animosity among all us officers concerning some of our dealings with Detroit headquarters.
>
> Mr. Conrad, believe me, I most certainly would not come under the tongue of good report to drag out and hash over a lot of trivia which is now dead and buried. I am sorry that I ever mentioned the lack of liaison between here and headquarters. Obviously, that lack does not now exist.
>
> I informed you that I wished to withdraw from membership and I believe that I have now waited out my grace so I have probably been dropped from the rolls. It's my bed and I will probably have to lie in it, but I am now sorry that I committed myself because I do think a great deal of this Society and I do realize what men like you and others are striving to do.
>
> I would appreciate hearing from you. Thank you again for your very courteous letter. Please excuse my discourtesy in not making a prompt reply.

New officers of Baltimore chapter are inducted by T. J. Donovan, Jr. (at microphone), Philadelphia director. From left: Thomas Burke, alternate; Andrew Jones, delegate; Robert Brickett, chairman; Anthony Taormina, first vice-chairman; John Schukraft, second vice-chairman; Charles Janus, secretary; Herbert Middlestadt, treasurer.

Rockford Party Visits Wisconsin Machine Plant

Rockford, Ill.—Some 50 Rockford members recently made an all-day trip to the Gisholt Machine Co., Madison, Wis.

Prior to the plant tour the engineers were luncheon guests of the Gisholt Company at the Ace of Clubs Restaurant in Madison. C. J. Baxter, general sales manager, was host and introduced some of the department heads.

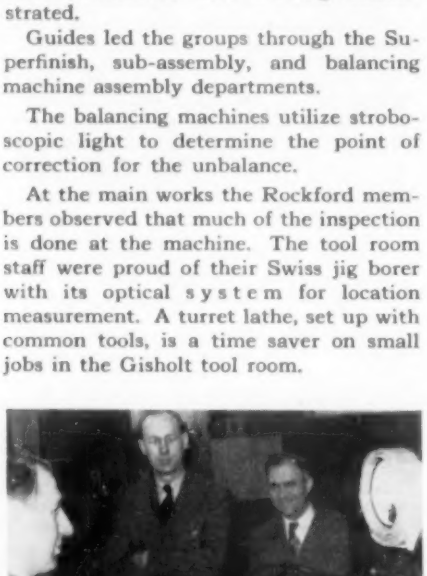
After assembling in the conference room at the plant, the party was welcomed by C. K. Swafford, vice-president and works manager. J. R. Wrage, personnel manager, traced the firm's history.

In small escorted groups, the visitors passed through the engineering department, laboratories and experimental shop. On the test floor of the assembly building several machines were being demonstrated.

Guides led the groups through the Superfinish, sub-assembly, and balancing machine assembly departments.

The balancing machines utilize stroboscopic light to determine the point of correction for the unbalance.

At the main works the Rockford members observed that much of the inspection is done at the machine. The tool room staff were proud of their Swiss jig borer with its optical system for location measurement. A turret lathe, set up with common tools, is a time saver on small jobs in the Gisholt tool room.



ASTE visitors from Rockford watch a Gisholt employee check out a dynetric balancing machine.

In the heat treating department an electrolytic descaler with automatic cycles and temperature controls is used instead of sandblasting. Heat treating cracks show up in this process, and the 25 millionths of tin plating acts as a rust preventive on the surface of the parts. The homocarb and normalizing furnaces also interested the ASTE'ers.

Gear finishing held their attention next. The first gear of each setup is thoroughly checked at the gear booth before the remainder of the run is fabricated. After inspection of tooth form on an involute checker. the gear is checked for tooth bearing, runout and noise. During the tour several grinding machines were busy finishing alloy steel helical gears.

At the conclusion of their visit, the out-of-towners returned home in a chartered bus and several automobiles.

Diesel Locomotives Repay High Cost in Three Years

Pittsburgh, Pa.—Although diesel locomotives cost nearly twice as much as steam engines of the same power, they pay for themselves in from three to five years through lower operating costs, according to J. H. Gauss, assistant manager of sales, locomotive and car equipment divisions, General Electric Co., Erie.

Low fuel consumption and maintenance and longer range between stops for fuel and water were cited as advantages for diesel-electrics as Mr. Gauss discussed "Today's Locomotive Industry" before a dinner meeting of Pittsburgh chapter, held April 7 at Hotel Sheraton. Steam locomotives, he added, are no longer being built for use in the United States.

Showing slides, he explained how diesel locomotives for various types of service are constructed in the G.E. shops. His talk was supplemented with a color film, "Railroadin'." An active question period followed.

W. J. Bickmore, first vice-chairman, presided and J. M. Lloyd, program chairman, introduced Mr. Gauss.

* * *

"Tooling for Resistance Welding" was the technical subject at the May 5 dinner meeting. The speaker, S. A. Bodenheim, Jr., of Federal Machine and Welding Co. showed a film and narrated slides illustrating his talk.

Chairman G. C. Wood presided over the meeting.

Shows Basic Hydraulics In Chalk Diagrams

Evansville, Ind.—International Steel Co. of Evansville was host to Evansville chapter for its April 10 meeting. About 65 members and guests gathered in the company recreation hall to hear R. P. Esser, chief engineer of TEC Engineering Co., Logansport, present "Fundamentals of Industrial Hydraulics."

While explaining types of hydraulic pumps, cylinders and motors, Mr. Esser named advantages, drawbacks and limitations of each type. He used chalk diagrams for illustrations. A short question and answer period followed his talk.

R. P. Esser of TEC Engineering Corp. illustrates with diagrams while talking on hydraulics to Evansville members. Watching at right are: Walter Stippler chairman, and Leo Luke, program chairman.

Leo C. Luke, chief tool designer at International Steel, was program chairman.

Tells Trends in Turning

Washington, D. C.—N. H. Critten of Monarch Machine Tool Co. addressed a meeting of Potomac chapter April 6, speaking on "Newest Developments in the Turning Field."

The talk was accompanied by sound films illustrating recent advances in profiling, turning intricate shapes, and automatic speed control screw machines, as previously reported in *The Tool Engineer*.

Hugh M. McLeod, chapter chairman, presided.

STUDENTS MEET—Left: Speaking at the University of Pennsylvania, J. C. Whitesell of The Budd Co. analyzes a tool engineer's work for engineering students. Right: J. R. Weaver of Baldwin Locomotive Works answers students' questions in "Stump the Experts Forum" at Drexel Institute of Technology. From left: K. W. Riddle, first vice-chairman of Philadelphia chapter, and the panel of experts: L. S. Paulsen of Link-Belt Co., Mr. Weaver, F. L. Creager of RCA, William Reeser of Swarthmore College and Prof. J. H. Billings of Drexel. Meetings were sponsored by Education Committee of Philadelphia chapter.

Students See Heat Treat Demonstrations at Plant

Philadelphia, Pa.—Thomas J. Donovan, ASTE national director, was recently host to the tool and die designing class of Spring Garden Institute at his heat treating plant.

Mr. Donovan explained the operation and control of heat treating equipment, demonstrating with actual workpieces. He then presented his tool engineering quiz, familiar to *Tool Engineer* readers.

Refreshments were served before the meeting adjourned.

* * *

The Spring Garden tool and die students heard another lecture sponsored lately by Philadelphia chapter when Edward R. Glenn spoke on "Design, Choice and Use of Gages for Dimensional Checking."

Originated Training Program

A past chairman of the chapter and one of the original group sponsoring the ASTE tool and die course at Spring Garden, Mr. Glenn wrote the curriculum and training program and conducted the pioneer classes in 1939.

Without gages, Mr. Glenn pointed out, our present system of interchangeability would be impossible. Dial indicator, air, electronic, and special gages were discussed along with the correct use of each type.

The speaker described gaging and sorting in high production industries. He stressed quality control systems and their economic importance in manufacturing. Mr. Glenn answered the students' questions at the close of the meeting.

Dayton Engineers Inspect Power Plant Construction

Dayton, Ohio—On April 10 Dayton chapter made a trip to the O. H. Hutchings Power Station below Dayton, to inspect a new electric generating plant that has been under construction for nearly two years. When completed the station will have a generating capacity of over 300,000 kw.

The 66 engineers in the party viewed the coal-fired boilers, whose exhausted steam is cooled by Miami River water flowing under the station. The electric energy output of 12,500 v is stepped up to 69,000 v by transformers in a substation outside the plant.

DENVER CELEBRATES ACHIEVEMENT OF MEMBERSHIP GOAL—One of six chapters to make their membership quota for the year, Denver members and their ladies celebrated occasion at inauguration dinner. T. J. Donovan, Jr., Philadelphia director, installs officers, from left: W. G. Axtell, chairman; Glenn Phillips, first vice-chairman; Lucian Beebe, second vice-chairman; F. J. Geoffroy, secretary; Donald Sailor, treasurer; C. J. Helton, alternate, and B. J. Hazewinkel, delegate. Mr. Donovan also presented his heat treat quiz.

Lathe Cheaper Than Mill in Producing Crankshafts

Windsor, Ont.—An automobile manufacturer's experience in weighing lathe turning against turn milling was interestingly presented to Windsor members recently by Frank M. Prucha, master mechanic, Cadillac Motor Car Div., General Motors Corp.

In outlining problems the company faced in machining their present production crankshaft, Mr. Prucha explained that the crankshaft design necessitates machining the sides of cheeks of all counterweights. Any tool block designed for cheeking the counterweights and turning the main and crankpin bearings must be of very narrow construction.

Lathe Makers Thought Job Impossible

Lathe manufacturers considered it impossible to combine the turning of all bearings. But a turn milling machine used successfully on outboard engines seemed to offer advantages of a better job with less equipment and fewer operations—two machines and operators against six. Estimated results were not obtained at first, however.

Mr. Prucha described improvements which brought the main bearing machine up to the expected production and the crankpin machine to 75 percent of the original estimate. Cost of cutter blade replacement and cutter grinding is still excessive, he admitted.

While developing the turn mill improvements, two lathes were put into service to meet the production schedule. Then it became apparent that some of the earlier misgivings about crankshaft lathes were groundless. Through a new tool block arrangement, production of the crankpin lathe was upped 60 percent or more. This made it possible to cheek and turn each shaft at one setting. Two crankpin lathes could do the work originally estimated to require four.

Since accurate tool cost data compiled over a long period proved the lathe tool cost lower than cutter costs on the turn mills, the latter are being discontinued.

Going on to processing or transfer type machinery, Mr. Prucha defined this equipment as "a series of machines arranged in proper sequence and spacing to allow the automatic transfer of the workpiece to the next station after completion of an operation."

Design of the cylinder heads for a V-8 engine makes transfer machine tooling feasible, he stated, as he detailed the operations employed. Chip traps should be avoided, he warned. Chip conveyors are a must as it is almost impossible to design chip tote pans in the base of transfer machines. Mr. Prucha recommended avoiding precision fits on transfer bars as any misalignment between units will cause the bar to bind and gaul, resulting in a major repair job.

In conclusion the speaker asserted that high production is not always necessary to justify transfer machines. Twenty pieces per hour for a number of varied operations on a part difficult to handle may warrant such equipment, he added.

Details New Strain Gage

Elmira, N. Y.—Technical speaker at the May 1 meeting of Elmira chapter was Francis G. Tatnall of the Baldwin Locomotive Works.

His discussion of current testing methods included practical applications for a new device to accurately measure all types of strains and stresses.

Left: T. J. Donovan, Jr., awards silver dollar to Spring Garden Institute student for correct answer to heat treat question. Right: V. H. Ericson, Worcester director, begins installation service at Twin States chapter. Officers, from left: George Julian, secretary; Robert Laffin, second vice-chairman; F. J. McArthur, first vice-chairman; H. H. Ranney, chairman, and Clifford Howe, treasurer.

Left: David Ayr, National Machine Tool Builders' Association president, tells Rochester chapter how high spindle speeds and more horsepower are answer to demand for greater productivity. From left: Tell Berna, general manager of NMTBA, William Gordon, past chairman of the chapter; Emmett Moore, chairman; Mr. Ayr, G. S. Fifield, district manager, Hendey Machine Co., and H. O. Simon, another past chairman.

Center: J. M. Johnson and V. L. Nickell of the Illinois educational system, R. H. Morris, a former ASTE president, and T. C. Barber, chapter chairman, were prominent figures at recent educational meeting of Chicago chapter. Right: F. C. Poulsen of Porter-Cable Machine Co. addresses Los Angeles chapter on "Wet and Dry Belt Grinding." Frank Bale (right) of Bell Equipment Co. sponsored the meeting.

Tool Builders Up Speeds, HP to Pace Productivity

Rochester, N.Y.—The trend of machine tool builders to design for higher spindle speeds and more horsepower for using carbides is the answer to industry's demand for equipment to maintain the nation's high production economy.

These features are in addition to sturdier construction for machine life, hydraulics, automatic and semi-automatic feeds, and mechanical parts handling, according to David Ayr, president of the National Machine Tool Builders' Association and of Hendey Machine Co. Mr. Ayr emphasized these factors while reporting "Recent Developments and Trends in the Machine Tool Industry," at a Rochester chapter meeting, April 18, at the Liederkranz Club.

Berna Tells How to Compute Returns

Tell Berna, general manager of NMTBA, explained fundamental steps in computing return on invested capital, when recommending new equipment. He stressed proper appraisal of weak spots in manufacturing as well as of accuracy and quality of work.

The meeting, honoring charter members, followed a reception and dinner. Chairman Emmett C. Moore welcomed the 125 members and guests present and introduced Clifford Sears who had welcomed the charter members to the first organization meeting of the chapter on February 25, 1938. Mr. Sears and 15 of the original 80 members were applauded.

Speakers' table guests introduced by Mr. Moore were: William Kamola, a former program chairman, and assistant tool engineer at Commercial Controls Corp.; Gordon Watt, equipment engineer, Delco Appliance Div., and Herbert O. Simon, assistant master mechanic, Rochester Products Div., General Motors Corp.; William Hallett, assistant superintendent of engineering and maintenance, Kodak Park Works, Eysel Gay, machine and tool engineer, and Past Chairman William Gordon, supervisor of tool engineering, Camera Works, Eastman Kodak Co., and Guy S. Fifield, district manager, Hendey Machine Co.

Roger F. Waindle of Aurora, Ill., ASTE director, also was presented. Past chairmen present included: Earl Gruendike, Earl DeBisschop, John Dense, Charles Codd and Chauncey Newton.

Belt Grinding Advantages Demonstrated in Film

Los Angeles, Calif.—Grinding procedures as applied to production parts, dies, die castings and tool room use were discussed at the April 13 meeting of Los Angeles chapter.

Fred C. Poulsen, western representative for Porter-Cable Machine Co., presented a sound motion picture, "Wet and Dry Belt Grinding," emphasizing time-saving features of belt grinders. Contour grinding, flat burring and parallelism of opposing surfaces were illustrated with sequences made in production shops.

A group of "kiddie" television stars, presented by Louis DaPron, dance director of Universal International Pictures, entertained after the technical program.

Houston Members Visit Oil Well Tool Plant

Houston, Tex.—Nearly 100 members of Houston chapter saw how cutting tools are made for the oil industry when they toured the Reed Roller Bit Co. plant for their April meeting.

The engineers found the plant well laid out for the manufacture of rock bits, tool joints and drill collars. Tooling is constantly being improved to produce these items more efficiently.

Past Chairman Homer Briggs, a tool engineer at Reed, conducted the AST E'ers through the plant.

Officers who will direct affairs of Houston chapter this year are, from left: H. G. Boswell, treasurer; H. O. Traughber, secretary; G. L. Freeman, second vice-chairman; R. E. Schuller, first vice-chairman; T. J. Gilchrist, chairman, and Paul Brainard, delegate.

Educator Says Industry Needs More Technicians

Chicago, Ill.—In the past 20 years the ratio of technicians required to each engineer has risen from 2.7 to 5, Vernon L. Nickell, superintendent of public instruction for the State of Illinois, quoted while addressing 250 Chicago Chapter and student members and their guests.

Speaking April 4 at the Allied School of Mechanical Trades, Mr. Nickell pointed out that these figures prove a need for more graduates of private vocational and technical schools. Such institutions, he added, can provide more specialized training to selected groups than is possible in public schools.

H. V. Loeppert (right) of Boyd-Wagner Co. is applauded by students of Allied School of Mechanical Trades after his address on Precision Grinding. Richard Lingen, ASTE student chairman, is at right.

Ray H. Morris of Hartford, Conn., a former ASTE president, also spoke briefly. Addressed primarily to the student body, his remarks included advice from his own experience in industry.

A. J. Schwister, retiring chairman of Chicago chapter, swore in new ASTE student officers as follows: Richard E. Lingen, chairman; Stanley Jaskiewicz, first vice-chairman; John Duda, secretary; and Michael P. Unitson, treasurer.

Prior to the meeting the entire party toured the seven-floor school plant.

"Precision Grinding" was the subject discussed at a meeting of the Allied student section, April 19.

As guest speaker, H. Verne Loeppert, vice-president, Boyd-Wagner Co., gave an overall picture of abrasive wheel manufacture and standardized marking methods. Mr. Loeppert discussed surface, centerless, and internal grinding of various materials, according to hardness.

Chairman Lingen presided and introduced the speaker to the 85 members and guests present.

Describes Lubrication For Spindles, Hydraulics

Richmond, Ind.—Forty-eight members and guests of Richmond chapter heard E. B. Fremon talk on "Machine Tool Lubrication" April 11, at Morton center.

Mr. Fremon, who is chief engineer for the Lubrite Div. of Socony-Vacuum Oil Co., Inc., discussed lubrication requirements of precision machine tool spindles and described important phases of hydraulic lubrication. His talk was illustrated with slides. Program Chairman Dezell Gibbs introduced Mr. Fremon.

Mervin E. Culbertson, chapter chairman, introduced committee chairmen for the coming year: James C. Brindell, entertainment; Harry Alter, membership; Horace G. Webb, public relations; Ralph R. McKee, industrial relations; Lowell B. Penland, education; Carl M. Huth, constitution and by-laws; Elbert Hale, standards; H. V. Towsley, editorial; and Dezell Gibbs, program.

The following plant representatives were appointed by Mr. Culbertson: Ralph McKee, The Crosley Corp.; Howard Haworth, Belden Mfg Co.; Pierre Perrine, Knowles Tool Corp.; Russell Culbertson, International Harvester Co.; Royden Parke, National Automatic Tool Co.; Dezell Gibbs, Paul McCombs and Charles Leonard, Perfect Circle Co. plants, and Lester Wright, Automotive Gear Works.

Rev. Robert Fribley of the Central Methodist Church gave the invocation. The meeting was preceded by a dinner.

U. S. Tops in Tooling, Says World Traveler

St. Charles, Ill.—Importance of planning, processing and the tool engineer to U. S. industrial supremacy was impressed on W. C. Denison, president of Denison Engineering Co., Columbus, Ohio, during a trip to Europe as a member of the 'Round the World Town Hall Meeting.

Mr. Denison stressed this in a non-technical talk, "Tooling for Peace," before 85 Fox River Valley members and guests attending a meeting, April 4, at the Baker Hotel.

Robert Krepps (center) of Denison Engineering Co. is dinner guest of Fox River Valley chapter before his film lecture on the Multipress. At left and right are George Bodi, program chairman, and G. M. Waller, chairman.

The technical session was presented by Robert Krepps, regional manager of the Denison firm. Mr. Krepps showed a film, "The Multipress and How to Use It," and displayed parts assembled on this machine.

Moved lately? Do we have your new address?

CHARTER MEMBER CONDUCTS EIGHTH INSTALLATION—Upper: Eugene Bouton, a charter member of Racine chapter, made his eighth annual trip from Milwaukee to install the officers of his home chapter. From left: Robert Schultz, first vice-chairman; George W. Christiansen, immediate past chairman; Mr. Bouton, W. J. Meinhardt of the Meinhardt Diamond Tool Co., who spoke on "Uses and Abuses of Diamond Tools in Industry"; George Tigges, chairman; Myron Knapp, secretary, and George Strombeck, second vice-chairman. Lower: Being intailed at Tri-Cities chapter are, from left: Robert E. Cannon, treasurer; Gilbert H. Jording, secretary; L. R. Johnston, second vice-chairman; Joseph Zelnio, first vice-chairman, and Jesse L. Howe, chairman. A. L. Geiger is installing officer.

Names Factors Entering Ball Bearing Selection

Kansas City, Mo.—In selecting ball bearings for specific jobs, speed, required life, available space, performance accuracy, alignment of housing and shafts, cost and weight should all be considered.

This was emphasized by L. A. Hilles of Fafnir Bearing Co., New Britian, Conn., while addressing Kansas City chapter, April 5, at Roselli's Restaurant.

Ball bearings, Mr. Hilles continued, are ideal for high speed requirements. Where excessive vibration is encountered, retainers cannot be used. For shock load applications machined bronze retainers are recommended. Thrust loads require the maximum type of bearing, while the Conrad type is needed for radial loads.

Development and adoption of A.F.B. M.A. standards have simplified the application and design of bearings, the speaker added.

In production, balls and races are graded according to size, then assembled. Balls must not touch the bottom of the inner race. From 60 to 63 percent of the bearing thickness is in the ball section. Lubrication is important to cut friction retainer and to prevent rust, but the lubricant must be clean, he cautioned.

Among assembly suggestions Mr. Hilles pointed out that a press fit is required on the rotating member and a slip fit on the stationary member of the assembly. Temperature differentials also should be considered. To insure proper assembly, he concluded, fitting suggestions in the catalog should be followed.

Tells Carbide Advances

New Haven, Conn.—Progress in carbides during the past five years was reported to some 50 members of New Haven chapter by Philip M. McKenna, president of Kennametal, Inc. Mr. McKenna was the technical speaker at a meeting held April 27 at Hammond Laboratory, Yale University.

His talk included the use of sintered titanium for cutting tools and in other applications, as reported in earlier issues of *The Tool Engineer*.

Quality Control Winning Wide Industry Acceptance

San Francisco, Calif.—Quality control in reconditioning ammunition and its components was detailed at Golden Gate chapters' April meeting by Frank Hund, quality control laboratory director, U. S. Naval Magazine, Port Chicago, Calif. Mr. Hund addressed the members on the 18th at the Shattuck Hotel, Berkeley.

The speaker compared the slow but steady acceptance of this relatively new inspection procedure to the introduction of tool engineering, which also had to overcome prejudice and objections before gaining full recognition. While discussing the history, savings and other benefits of controlling quality through mathematical and statistical evaluations, he called attention to the increasing number of companies who are incorporating this procedure in their inspection.

The audience of approximately 80 members and their guests enjoyed a spirited and extended discussion following Mr. Hund's talk.

Osborn Heads CTSC

Cleveland, Ohio—Dr. H. B. Osborn, Jr., technical director of the Ohio Crankshaft Co., is the new president recently elected by the Cleveland Technical Societies Council.

The Cleveland ASTE chapter, which Dr. Osborn also heads, is one of the 42 technical and scientific groups composing the council. In addition Dr. Osborn has been reappointed chairman of the Society's National Membership Committee.

An authority on induction heating, he speaks frequently on this subject.

Refractory Metals Shown

Fond du Lac, Wis.—A motion picture lecture, "The Refractory Metals," was the technical feature for the April 14 meeting of Fond du Lac chapter, held at Sheboygan. A. L. Percy and Van W. Burris from Fansteel Metallurgical Corp. presented the film.

Attendance prizes were won by F. D. Detch of the Electric Sprayet Co., Sheboygan, and A. M. Juckem of the H. G. Weber Co., Kiel.

Death Takes Two Former Presidents of ASTE

Two of the Society's early presidents recently passed away within a few weeks of each other.

Joseph A. Siegel, sales engineer for A. C. Haberkorn Co., Detroit, succumbed to a heart attack, April 1, just four days after his 59th birthday.

During Mr. Siegel's term as the first president of ASTE, the organization grew from 114 members when the charter was closed March 31, 1932, to 465 a year later. Only a month after he had taken office the first issue of the Society publication appeared, under the title, *ASTE Journal*.

J. A. Siegel

R. M. Lippard

Mr. Siegel maintained his interest in the Society until the time of his death. He served a number of terms as director and one as national publicity chairman. As dean of the past presidents, he headed the Judicial Committee and the Honor Awards Committee. He composed both words and music for the Society song, "On With the ASTE."

Before his association with the Haberkorn company, he was employed for 20 years as chief tool designer and in the standards department of Packard Motor Car Co. He was born at Marquette, Mich.

Six weeks earlier Robert M. Lippard, 61, foreign sales manager of the Heald Machine Co., Worcester, Mass., preceded Mr. Siegel in death. Mr. Lippard also was stricken with a heart attack. He had been with Heald since 1922.

The Society's fourth president, Mr. Lippard took office in March, 1935. In the previous depression years Society membership had slumped to 418, but it was nearly double that figure when he left the chair in 1936. During his administration the Society received its first recognition from industry—an invitation to sponsor a meeting of the Machine Tool Congress held in conjunction with the National Machine Tool Builders' show at Cleveland.

Through this publicity, membership grew and requests began to come in for chapters in other cities. Racine and Cleveland were both chartered during that year.

Following his retirement from the presidency, Mr. Lippard headed the National Constitution and By-Laws Committee for seven years. He was also national industrial relations chairman and served on the board of directors.

Born at Marlboro, Mass., Mr. Lippard was educated in the public schools there. He graduated from the General Electric Trade School at Lynn and studied at the New England Conservatory of Music. He was a director of the Worcester Civic Music Association. During earlier residences in Cleveland and Detroit, he directed church choirs. His affiliations included the New England Export Club, the Foreign Trade Council, Heald Old Timers, and Masonic orders.

ASTE lost another of its first national officers when Earl J. Ruggles, production engineer at Gemmer Manufacturing Co., Detroit, died April 29.

Mr. Ruggles was one of the Society's founders and its second vice-president under Mr. Siegel. He was born in 1896 at Grand Rapids, Mich., and worked in a number of Detroit auto plants before becoming a draftsman at the Gemmer company in 1922.

Power Hand Tools Help Speed Auto Assembly

Hamilton, Ont.—An expert in automotive tooling addressed Hamilton chapter recently on "Tool Engineering for Assembly Line Production." A. S. Evans, a tool engineer on the Chevrolet, Pontiac and Oldsmobile assembly lines, opened his talk on this subject with a film, "Introducing the New Man to His Job."

With blackboard drawings Mr. Evans depicted how "prototypes" or models are used to solve assembly problems. He showed how the trend toward such power hand tools as riveters, drills, screw drivers, brazers and welders has resulted in better jobs at less cost.

In closing, the speaker explained some of the principles involved in statistical quality control, "a tool to produce better workmanship." An interesting question period followed his talk.

William Orlick, program chairman, introduced Mr. Evans and William Beattie thanked him.

W. A. Dawson, a former national officer, installed the following new officers: George Churchill, chairman; William Peacock, first vice-chairman; Sydney M. S. Dunn, second vice-chairman; John E. Yorick, third vice-chairman; Howard J. Boucher, secretary; and Harry B. Ward, treasurer.

George Gilmour, retiring chairman, welcomed visitors and read his report on the year's activities.

Technical problems submitted since the last meeting were answered by Gordon Hall, chairman of the Mechanical Problems Committee.

Hamilton chapter officers stand before W. A. Dawson, a former national officer, to take their oaths. From left: H. B. Ward, treasurer; H. J. Boucher, secretary; J. E. Yorick, third vice-chairman; S. M. S. Dunn, second vice-chairman; William Peacock, first vice-chairman, and George Churchill, chairman.

Coming Meetings

CENTRAL PENNSYLVANIA—June 15. Stag Party. Program to be announced.

CHICAGO—June 10, 11:30 a.m., Hickory Hills Golf Club, 8800 W. 95th St. Golf tournament, stag, and dinner party. March 17-21, 1952. Tool Engineers Industrial Exposition.

CLEVELAND—July 1-4. Annual trip to New York. July 30. Annual boat trip to Cedar Point, Ohio.

DENVER—July 22-23. Fishing trip, Woods Lake Camp near Eagle, Colo. Other chapter members invited. Contact C. J. Helton, 61 S. Cherokee, Denver, Colo.

DETROIT—July 15. Picnic for members and families. Beverly picnic grounds, Mound and 12 Mile roads. Starts 10:00 a.m. Golf and baseball for men; races, games, prizes for children. Refreshments. Call Al Conti, chairman, at TR 2-5467. August 5. Golf party, place to be announced. October. Eighteenth Semi-Annual Meeting, ASTE Board of Directors.

ERIE—June 24. All-day picnic at General Electric picnic grounds.

NEW HAVEN—June. Annual outing, Guilford Lakes Country Club, Guilford. Golf, volley ball, horseshoes and other events.

NEW YORK, GREATER—March 15-17, 1951. Annual Meeting, ASTE.

PHILADELPHIA—June 10. Fourth annual outing, Philadelphia Rifle Club.

WATERLOO AREA—Stag golf party at Plymouth Country Club, Plymouth, Mich.

Silica Mine Highlights Automobile Plant Tour

Minneapolis, Minn.—About 200 members and guests of Twin Cities chapter descended 100 feet into the earth below the Ford Motor Co. assembly plant at St. Paul, to explore tunnels of silica sand. The silica mine, unique among Ford plants, feeds a glass plant turning out 60,000 sq ft of glass per day for automobile windows.

Self-sufficient also for heat, power and light, the Ford factory has its own steam and hydro plants on the Mississippi, the visitors learned.

The evening trip, made April 5, included a tour of the assembly plant where 400 cars and trucks per eight-hour day roll off the line for distribution in northwestern states.

Robert Elliott, plant manager, was host for the occasion. Dinner at Lee's Village Inn preceded the tour.

More ASTE News on Page 90

TOOLS OF TODAY

Tool Control System Speeds Production

In line with the sharp trend toward automation, with the corollary of cost-cutting methods of manufacture, a tool control system developed by the Cross Company, Detroit 7, Mich., opens up broad vistas in the field of mass production. It may be applied to transfer machines, as illustrated, or to multi-station single-purpose machines or even to gangs of machines employed to perform various operations on similar classes of work. So used, the system portends marked economies in reduced tool upkeep and machine down-time.

The basic components of the system, which combines into a unit, are a master control board, shown in detail in the smaller photo, a master tool setting fixture, with gages, shown on the surface plate, a work bench and what is termed a "Toolometer", the latter actually a timing system that may be pre-set to the operating interval of a tool before regrinding is required.

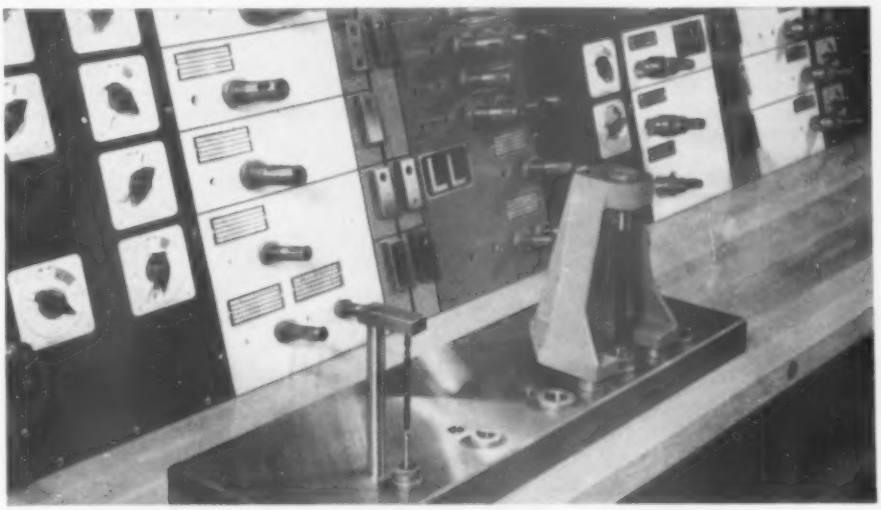
There would be one time dial for each cutting tool, and these dials—whether single or multiple—are coordinated with specific stations which, in turn, are designated by letters or numbers. Adjacent to the dials are replacement tools, with tool setting fixtures and gages disposed on the work bench.

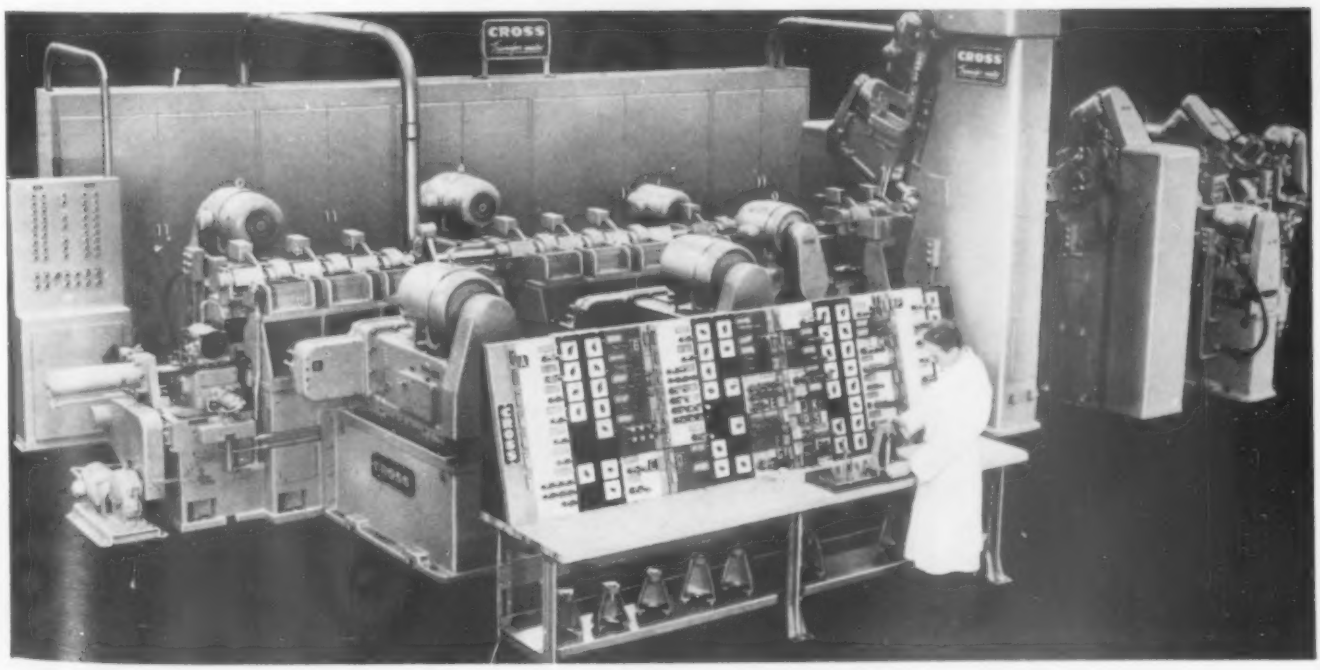
At the start of operations, the pointers of the dials are set at "start" position, then, as the machining progresses, the dials move at regular clock speed toward the "danger" mark, shown at about 1 o'clock position on the dials. At that point, the spindle of the corresponding station stops automatically, when the dull tool may be removed and a replacement installed.

The used tool is than sent in for regrinding and, on return to the control board, is pre-set to proper cutting position and placed in its allocated nest. Since two or more tools are held in readiness at all times, down-time is held at a minimum. Resetting time is also rapid because the tools are assembled in adjustable holders and pre-set to known length. There is no further adjustment after installation.

One evident advantage of the system is that the tools are not permitted to operate beyond the efficient cutting point. They do not "lose size", therefore, tool grinding becomes a sharpening rather than a salvaging process, resulting in greatly extended tool life. With this saving may be included an incidental yet considerable saving accruing from reduced scrap.

As an interesting note, the "danger zone" on the dials implies a 2-hour interval; thus, the operator can wait until several tools are "in the red", with the further implication that several stations may be serviced during the brief interval of down-time—said by the manufacturer to average about two minutes per tool. **T-6-1**





Interchangeable Punches

A complete line of standardized interchangeable Round Punches, made of high speed steel, has been introduced by Richard Brothers Division, Allied Products Corporation, 1560 E. Milwaukee Ave., Detroit 11, Mich. These punches

supplement the company's established line of round tool steel punches and are carried in stock in the same size ranges. As in the past, high speed steel punches of special shapes or sizes are also made to customers' specifications.

These punches incorporate the R-B interchangeable feature in which a ball bearing lock in the retainer engages in a ball seat on the punch shank, providing secure positioning both radially and vertically. This design permits instant insertion or removal of either the punches or dies.

A 2-page insert, prepared as a supplement to the Richard Brothers catalog and listing all sizes and prices of the high speed steel punches, is available, or, the complete 50-page catalog in which this information is included will be sent on a request on company stationery. T-6-2

High Frequency Alternators

A single or three-phase homopolar Inductor Alternator with electronic exciter regulator, providing a voltage regulation of plus or minus 1 percent and equipped with a low slip induction motor component to keep frequency within plus or minus ½ percent is announced by American Electric Motors, Inc., 4811 Telegraph Road, Los Angeles 22, Calif.

Used as a power supply for electronic gear, such as radar, x-ray, calculators, and induction heating, and for motor drives on high speed machine tools and instruments, the alternators are available in sizes up to 10KW, with frequencies up to 1500 cycles, and can be supplied either as self-ventilated, or as water-cooled for dusty, or hazardous locations.

Acording to the manufacturer, among the advantages of this high frequency power supply over other types of power source equipment, are independency of line frequency fluctuations since the machine is self-excited through high vacuum rectifiers, possibility of reducing, or even eliminating iron in load components and the minimizing of maintenance because of the lack of commutators, brushes and springs. T-6-3

Tensilend Electrodes

Arco Corporation, 1500 So. 50th St. Philadelphia, 43, Pa., announces a line of low hydrogen welding electrodes—called Tensilend—which are said to simplify fabrication by the elimination of preheat in welding low-alloy high-strength steels in the 70,000, 100,000 and 120,00 psi tensile strength class.

Tensilend 70, believed to have the broadest field of application, is developed for welding steels in the 70,000 psi class, can be used both for welding low-alloy high strength steels and also for welding mild steels under highly restrained conditions, high-carbon steels and sulphur-bearing free machining steels. In the other extreme, Tensilend 120—for 120,000 psi steels—was developed for marine applications, such as welding armor plate. Fully described in a bulletin covering the ABC's of hydrogen controlled electrodes. T-6-4

ARMSTRONG
TOOL HOLDERS
for every operation!

There are ARMSTRONG TOOL HOLDERS in sizes and types for every operation on lathes, planers, slotters and shapers—for the heaviest cuts; for the most delicate cuts.

With Standard shaped cutters, bits and blades of ARMSTRONG HIGH SPEED, ARMALOY (Cast Alloy) and ARMIDE (Carbide-Tipped) they provide a system of tooling that assures maximum production per machine hour, lower tool costs, and higher machining profits.

These permanent multi-purpose tools can be picked up as needed from your industrial distributor. Use them wherever possible to increase number of pieces per hour, to lower cost per pieces.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

5257 W. Armstrong Ave., Chicago 30, Ill.

Write for our New S-48 Catalog.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-70

Turnstile Bed Turret

The South Bend Lathe Works, South Bend 22, Ind., is now producing, as an accessory, a hand feed turnstile-operated Bed Turret designed to be accurately fitted by the user to the inside bed ways of any 16 in. swing South Bend Lathe. Such an installation provides for economical production of duplicate precision parts without changing the basic lathe in any way. The turret, which is designed to operate easily and efficiently, can be removed at any time and the tailstock remounted for regular lathe work.

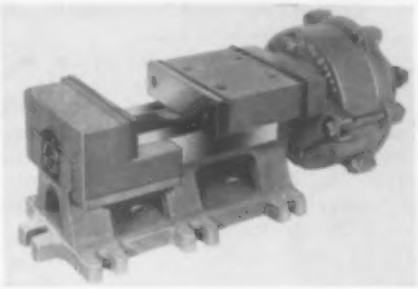
All feeds are hand operated through the balanced turnstile, and the turret can be locked in position at any point along the usable length of the lathe bed. The turret base clears the saddle wings so that the hexagon head can be positioned close to the spindle nose, thus eliminating excessive overhang of the turret tools. The turret ram has stop screws for each tool position, which index automatically with the head, which in turn, may be back-indexed or spun to skip tool positions. A crank-type binder lever is provided for locking the turret head.

Specifications of the South Bend Hand Feed Turnstile Bed Turret are: effective feed of the turret slide 6⅛ in.; distance from center of turret tool holes to top of slide 2½ in.; head to be bored by user to take six standard turret tools with 1½ in. diameter shanks; distance between opposite turret faces is 9⅜". When properly installed, the turret head is said to index to within plus or minus 0.0005 in., measured 4 in. from the turret face. This accuracy is assured by a superfinished index pin fitted to a lapped steel bushing.

Available for use with this unit are two other accessories for multiple tool repetitive operations. They are a square turret tool block and a double tool cross slide for the South Bend 16 in. lathe carriage. Either accessory will permit using multiple cutting tools, as desired; three on the double tool cross slide or four on the square turret tool block, in addition to six tools available on the turret head. **T-6-5**

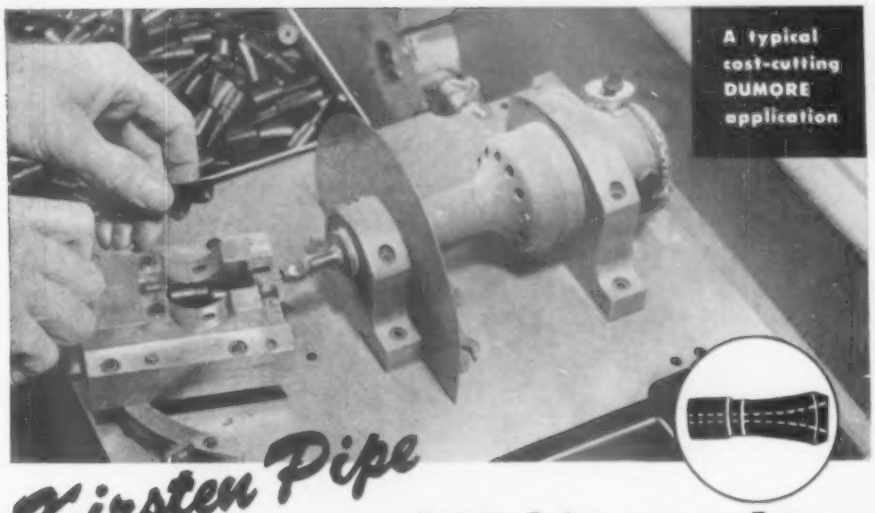
VI-Speed Machine Vise

A Machine Vise—Model 811, by the Van Products Company, Erie, Pa.—combines simple design, accuracy, long stroke and high power, the later achieved from use of a large diameter cylinder rather than from use of levers, cams or wedges.



Sustained accuracy is assured by adjustable gibs, and the moving jaw is so designed that rise from the vise bed, when applying clamping pressure, is prevented by long arms which extend forward from the inner side of the jaw. This construction provides adequate leverage against unwanted jaw action.

Stroke of the Model 811 is 1¼ in., facilitating holding of variable-size work pieces; however, a 6 in. stroke is available for special uses. Jaws of the standard model are 8⅜ in. wide open to a measure of 11 inches. **T-6-6**



Kirsten Pipe routs 250 bits per hour with LOW-COST DUMORE SET-UP

"Dumore set-up is an ideal operation," says G. S. McCarthy, Works Mgr.

Dissatisfied with production and quality obtained by conventional drill press operation on tapered smoke slots in hard rubber pipe bits, Kirsten Pipe Co., Seattle, devised the ingenious set-up pictured above. Vibrationless Series 10 Dumore handgrinder drives routing bit as work is pivoted on sliding ways of holding fixture. Spring in fixture ejects finished bit, and compresesed air connection keeps work and fixture clean. Cost per piece, with labor, is only ¾¢.

Sold on DUMORE Dependability-Accuracy

"We use a Series 7 on a bench lathe to sharpen broaches. This costs only $500, where many plants buy a $3000 machine. Our successful use of Series 7 and Series 10's led to purchase of Series 44 for tool room and general maintenance use."

Versatile Dumore Grinders can be applied in your plant, on your production, tool room and maintenance operations, for only a small fraction of the cost of high-priced production tools. Ask your Dumore Distributor to suggest applications, or write for literature to The DUMORE COMPANY, Dept. F-43, Racine, Wis.

DUMORE

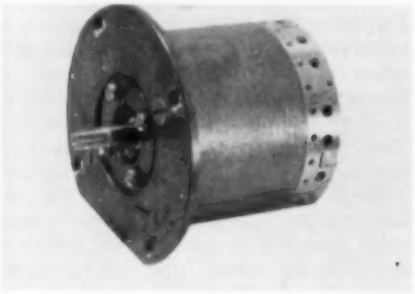
DH-2

P.S. For lower costs on internal and external grinding, light milling and drilling, investigate Dumore High-Speed Spindles.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-71

Magnetic Clutch

Designed for servos and other devices where rapid engagement and release is required, a compact Magnetic Clutch, by Barber-Colman Co., Rockford, Ill., has a capacity of 0.20 HP with an input of 3 watts. When the electromagnet is energized, the cork faced driven disc is clamped between two driving members. For high torque transmission, the driven disc is faced on both sides.



A splined bore in the driven disc permits easy coupling to the load, and a non-rotating electromagnet, with flange mounting, eliminates slip rings and auxiliary bearings. Driving plates are ventilated for rapid cooling. Maximum torque is 4 lb-in; maximum speed 3,600 rpm. Electromagnet input is 3 watts DC or rectified AC. **T-6-7**

DCMT Die Casting Machine

A 1-pound capacity zinc alloy high speed die casting machine—Model M55 A/HF-1P — is now available through DCMT Die Casting Machine Corp., 164 Duane St., New York 13, N.Y., Dep't TE. This die caster utilizes the novel principle of fast chill and high cycling speed on low-cost, small, single impression dies. Direct valving "explodes" air into the cylinder, causing supersonic piston speed which "shoots" hot molten metal into the cavities before it has a chance to cool off. In turn, this provides a small water-cooled sprue which solidifies instantly, resulting in a high speed cycle.

As claimed by DCMT, an average production of 500-700 shots per hour can be maintained by the machine. Die sizes up to 6 x 9 in. can be used. Small prefabricated die blanks are supplied with the machine and cavities can be machined directly into these blanks. Because of this economical method of die fabrication, combined with high speed cycling, production runs even as low as 2,000 pieces are said to effect tremendous savings.

Weighing only 470 lbs and taking but 24 x 12 in. of floor space, the machine is nevertheless applicable to an unusually wide range of die cast products—hardware, toys, machine and household appliance components and automotive accessories, DCMT, which maintains a complete engineering counseling service, will furnish a free cost analysis of the manufacturer's product, this in addition to the original die design which is furnished without charge for each machine. **T-6-8**

The new Gairing E-Con-O-Mill, Series 6500, 10-inch diameter, with twenty blades.

The New GAIRING

E-CON-O-MILL *Series 6500*

PATENT APPLIED FOR

with a greater number of blades

TWO years ago we introduced the original E-CON-O-MILL, the cone-type face mill, that saves on *grinding costs*, cuts down *tool inventory*, and reduces *machine* down-time.
Now we present this new E-CON-O-MILL, with all the economy features of the original, *plus* a greater number of blades.
Cutter bodies are of the cone type, and are made in diameters of 8, 10, 12, and 14 inches. They support the blades full length in accurately machined slots.
Blades of ½ by ⅝ tool bit type are tapered two ways, and tungsten carbide tipped. They come finish ground, and may be sharpened individually with the aid of the same combination grinding fixture and checking gage used for the original E-CON-O-MILLS. They are quickly inserted without removing the cutter from the machine. The same blades serve all sizes of Series 6500 cutters.
Available in three types: to cut steel, cast iron, and non-ferrous materials, each type with the proper carbide, and the tips ground to the correct radial and axial rakes.
Locks (the same as used in the original E-CON-O-MILL) are assembled in one piece, and remain attached when blades are removed.

The original Gairing E-Con-O-Mill, Series 2500, 6-inch diameter, with six blades.

GAIRING TOOLS

The GAIRING TOOL CO.
Box 478,
Detroit 32, Mich.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-72

THE TOOL ENGINEER'S *Service Bureau*

FREE BOOKLETS AND CATALOGS CURRENTLY OFFERED BY MANUFACTURERS

Gear Checker

Illustrated booklet presents gear checker for quick, accurate checking of gear dimensions including tooth spacing, helix angle, eccentricity and tooth size, helical lead, internal gears and other points; explanatory engineering photos show operation. **National Broach and Machine Co.**, 5600 St. Jean, Detroit 13. **L-1**

Micrometers

Folder R-3 describes simplified line of inside micrometers for measuring snap and "O" ring grooves, large, deep and small bores, wide variety of which can be measured with single instrument; detailed information also given concerning external dimensions. **Rimat Machine Tool Co.**, 1117 Air Way, Glendale, Calif. **L-2**

Motors, Small

Catalog shows line of small power motors with brief descriptions of use, accompanied by charts and graphs showing performance characteristics and engineering data plus engineering and wiring diagrams. **Barber-Colman Co.**, Rockford, Ill. **L-3**

Lathes

Special features and advantages of four models of recently introduced precision lathes stressed in illustrated Catalog No. L-10; specification and price lists for these light ten lathes and their attachments and accessories included. **South Bend Lathe Works**, 425 E. Madison St., South Bend 22, Ind. **L-4**

Tools, Carbide Tipped

Catalog No. 104 lists and illustrates line of various types drills, lathe centers, reamers and machine countersinks with data on their care and use, grinding information, and suggested feeds and speeds when drilling or reaming different materials. **Whitman & Barnes**, 40300 Plymouth Rd., Plymouth, Mich. **L-5**

Threaded Parts

"Cost Reducing Suggestions on the Design of Threaded Parts" presents current problems found in course of company's work, as well as suggestions for improvement in methods and general helpful data. **The Eastern Machine Screw Corp.**, 140 Truman St., New Haven, Conn. **L-6**

Abrasive Wheels

Folder in color describes and pictures company's recently developed reinforced hub wheel, a bonded abrasive wheel for portable machines, showing varied uses, construction and advantages. **Norton Co.**, Worcester 6, Mass. **L-7**

Plastic Coatings

Technical bulletin reports recent developments for plastic coating materials and methods, describing applications, characteristics and advantages. **Bee Chemical Co.**, 13799 S. Avenue "O," Chicago 33. **L-8**

Metal Cleaning and Finishing

Illustrated 24-page catalog discusses metal cleaning principles, showing widely varying machine types in operation views together with diagrammatic details. **The S. C. Baer Co.**, 1600 Times-Star Tower, Cincinnati 2. **L-9**

Chucks

Bulletin No. 1-50 describes line of drill and tap chucks pointing out advantages of their use and other general information; includes specification lists and drawings and up-to-date prices. **Scully-Jones and Co.**, 1915 So. Rockwell, Chicago 8. **L-10**

Dies, Press Brake

Spiral bound, indexed catalog on power press brake dies, both stock and custom-made, for forming metals; fully illustrated with accompanying explanatory notes; includes tables of tonnages for various bending and punching operations. **The Cyril Bath Co.**, 6999 Machinery Ave., Cleveland 3. **L-11**

Oil Seals

Sixteen-page handbook contains data on non-metallic oil seals with photos showing applications and installation; explains construction advantages and other pertinent information. **Johns-Manville**, 22 E. 40 St., New York 16. **L-12**

Grinding, Gear

Reishauer machines for high precision, high production tooth flank grinding described in Bulletin ZA 50; tables present examples of capacity, accuracy of work produced and specifications. **Cosa Corp.**, 405 Lexington Ave., Chrysler Bldg., New York 17. **L-13**

USE THIS HANDY FORM ➡

to obtain further information about advertisers, trade literature or tools of today appearing in this issue of THE TOOL ENGINEER. No postage needed.

THE TOOL ENGINEER, DETROIT 23, MICH.

READER SERVICE CARD

Please send me further information as indicated below:

(Mark Key Number of trade literature, tools or advertisements)

ADVERTISERS	TRADE LITERATURE	TOOLS OF TODAY
A—	L—	T—
A—	L—	T—
A—	L—	T—
A—	L—	T—

NAME _____ POSITION _____

FIRM _____ BUSINESS _____

STREET _____

CITY _____ ZONE NO. _____ STATE _____

Students are requested to write directly to manufacturers

Machining

"Our Story in Pictures" describes and illustrates company's contract manufacturing facilities for precision machine work, bronze and centrifugal castings and bronze products; includes outlines of production problems and solutions. **American Non-Gran Bronze Co.**, Berwyn, Pa. L-14

Carbide Tools

Brochure pictures line of tungsten carbide tools with dimensional drawings, specification and price lists; also outlines various grades of Willey's metal with suggested uses. **Willey's Carbide Tool Co.**, 1340 W. Vernor Hwy., Detroit 1. L-15

Lapping

Booklet tells in words and pictures method of flat lapping to close tolerances on automatic, high production basis, emphasizing its efficiency and advantages; chart enables preliminary production estimate of work. **Crane Packing Co.**, Dept. H-14, 1800 Cuyler Ave., Chicago 13. L-16

Steel, High Speed

Brochure introduces recently developed type of high speed steel with ultra high carbon content; data lists show content, effect of tempering, results of tests at elevated temperatures. **Vanadium-Alloys Steel Co.**, Latrobe, Pa. L-17

Precision Tools

"New Tools Booklet" describes and illustrates more than 60 tools which were introduced at the recent ASTE Tool Show; prices included. **The L. S. Starrett Co.**, Athol, Mass. L-18

Valves, Presses, Cylinders

Pocket-sized "New Products" booklet pictures the valves, presses, cylinders and accessories for air-operated equipment presented at recent ASTE Tool Show; also includes outlines of main features of the tools. **Hannifin Corp.**, 1120 S. Kilbourn Ave., Chicago 24. L-19

Press Cushions

Bulletin 212, covering cushions for all makes of presses, presents data for use in planning installations, general operation with accompanying engineering drawings with specification tables. **Clearing Machine Corp.**, 6499 W. 65th St., Chicago 38. L-20

Tools, Cutting

Comprehensive 462-page catalog No. 17 lists sizes and prices of line of precision cutting tools and companion products plus listings of solid carbide and carbide tipped cutting tools; includes 100 pages of tables and reference material. **Pratt & Whitney Div., Niles-Bement-Pond Co.**, Hartford, Conn. L-21

Casting, Precision

"New Horizons with Microcastings" includes specifications, step-by-step explanation of Microcast process, plus applications illustrated by specific examples; stresses design factors and industrial advantages. **Microcast Div., Austenal Laboratories, Inc.**, 715 E. 69th Pl., Chicago 37. L-22

Grinder, Surface

Folder No. 145-3RM gives principles of operation, general and detailed descriptions, with illustrations, of company's No. 24 duplex rotary type surface grinder with two rotary tables and magnetic chucks; formerly made by Hanchett Mfg. Co. **Mattison Machine Works**, Rockford, Ill. L-23

Slitters

Company's slitting lines for coiled strip and sheets described and illustrated in 76-page brochure which also traces evolution of multiple rotary slitters and explains basic considerations in selection of equipment; has information on production rates, general data, plus initial and operating costs. **The Yoder Co.**, Dept. 5561, 5500 Walworth Ave., Cleveland 2. L-24

Steel Hardening Compound

Folder contains description of steel hardening compound for high speed, low-cost case hardening, outlines method of application, advantages and cost. **The Miracaloy Corp.**, 50 Broadway, New York 4. L-25

Retaining Rings

Bulletin No. 7 presents engineering specifications and data on self-locking, triangular and grip ring type retaining rings; drawings show specifications and typical field applications. **Waldes Kohinoor, Inc.**, Long Island City 1, N. Y. L-26

Lift Trucks

Bulletin 5031 presents engineering sketches showing in detail features characteristics, special features and advantages of company's advance line of hydraulic lift trucks; complete construction data included. **Barrett-Cravens Co.**, 4609 S. Western Blvd., Chicago 9. L-27

Gears, Speed Reducers

Bulletin 125 pictures recently designed vertical gear shaft worm gear speed reducers describing their engineering features and outlining advantages; includes specification drawings and tables. **The Cleveland Worm and Gear Co.**, 3249-59 E. 18th St., Cleveland 4. L-28

Standards, Gears

Three American Standards (for fine-pitch gears covering straight bevel gears; design for worms and worm gears; and 20-deg involute system for spur and helical gears) developed to meet demand for mass production of small gears of high precision and interchangeability. **American Society of Mechanical Engineers**, 29 W. 39 St., New York 18; or **American Standards Assn.**, 50 E. 45 St., New York 17. L-29

Steel Selector

Nine-inch circular selector chart facilitates selection of proper steel for given application; need know only tool or die characteristic; easily used for quick reference when no metallurgist is available. **Crucible Steel Company of America**, 405 Lexington Ave., New York 17. L-30

BUSINESS REPLY CARD
No postage stamp necessary if mailed in the United States

FIRST CLASS
PERMIT NO. 10782
(Sec. 510, P.L. & R.)
DETROIT, MICH.

THE TOOL ENGINEER

ASTE Building

10700 Puritan Ave.

Detroit 21, Mich.

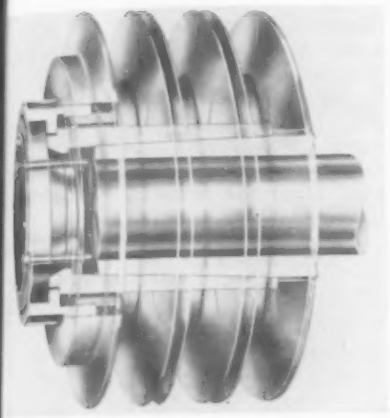
ATT: READER SERVICE DEPT.

USE THIS HANDY FORM

to obtain further information about advertisers, trade literature or tools of today appearing in this issue of THE TOOL ENGINEER. No postage needed.

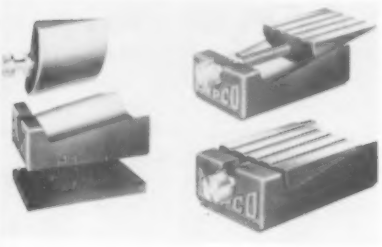
Adjustable-Diameter Sheave

The American Pulley Co., 4200 Wissahickon Ave., Philadelphia 29, Pa., announces an adjustable-diameter V-belt sheave, with taper bushing and taper sleeve on which the flanges are mounted. In addition to providing easy mounting and dismounting of the sheave, this double-taper hub feature is designed to rigidly lock the unit into a single, "solid" sheave, thereby eliminating vibration, wear and fretting corrosion—said to be unusual performance in an adjustable-diameter sheave.



Advantages claimed for the design are: easy mounting and dismounting; positive lock-up of the flanges; no fretting corrosion or freezing; no vibration; silent operation; and elimination of V-belt misalignment. The sheave, which should be especially useful in the textile industry and wherever drive conditions are unusually severe, is immediately available for most standard and wide-range adjustable-diameter drives. **T-6-9**

Machine Leveling Jack



An improved Empco machine-leveling Jack, that features vibration absorbing mounting pads called Vi-Sorb, is announced by Enterprise Machine Parts Corporation, 2731 Jerome Ave., Detroit 12, Mich. Vi-Sorb is a vibration absorbing material developed for use under heavy loads to eliminate creepage and to reduce machine maintenance costs due to vibration.

Lower in design—2 in. high, 6 in. long and 3½ in. wide—the Empco jack's self-aligning feature has been improved by compensating for more uneveness of floor while retaining full bearing of lifting surfaces up to maximum height of adjustment. **T-6-10**

Positioning Table

A Positioning Table, built for special applications by the Hamilton Tool Company, Hamilton, Ohio, is particularly applicable for safe positioning of heavy dies. The table can serve several machines and is transported by crane as required. It is accurately located, relative to each machine, by insertion of four false legs into prepared holes in the floor.

The die is placed on the table by means of overhead crane, and the table is electrically elevated or lowered to desired height for transfer of the die to the press. Dogs, which travel across the face of the table, are then energized and the die is accurately "positioned" in the press. The die may be removed by reversing the process.

Designed to minimize handling and to save time along with reduced operator fatigue and enhanced safety, the table weighs 5,500 lbs., has working area 60 x 96 in., and has a capacity lift of 50,000 lbs., minimum height 21 in., maximum height 31 inches. **T-6-11**

Avoid Mixed Steels

In Your

STOREROOM

MACHINE SHOP • HEAT TREATING PLANT

By Using

A. Milne & Co's.

KOLORKOTE TOOL STEELS

Each Bar is Spray-Painted the Entire Length
So You *ALWAYS* know the Exact Analysis

With Every Shipment
We Send

A HEAT TREATMENT CARD

So You Know

What you get! When you get it! As long as you have it!

Write for our Tool Steel Selector
Showing analysis and color code of our
COMPLETE LINE OF TOOL STEELS
HOLLOW AND SOLID

A. MILNE & CO.
(ESTABLISHED 1887)

WAREHOUSES
New York - Pittsburgh - Chicago
Boston - Philadelphia - Cleveland
New Britain

SALES OFFICES
St. Louis - Dayton - Rochester, N. Y.
Bridgeport, Conn.
Springfield, Mass.

PACIFIC COAST
Office and Warehouse San Francisco, California, 201 Main Street

For Southern California
Taylor-Sportswood of California
Los Angeles, California

For Pacific Northwest
Pacific Machinery & Tool Steel Co.
Portland, Oregon

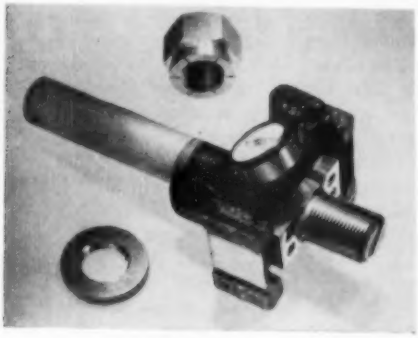
SOUTHWEST
Vinson Supply Co.
3331 Hagger Drive, Dallas, Texas

CANADA
Sanderson-Newbould, Ltd.
Montreal Toronto

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-75

Internal Thread Gage

The Bryant Chucking Grinder Company, Springfield, Vt., announces the redesign of their portable Internal Thread Gage, used for the inspection of internal threads in a range 5/16 to 1 in., either National Coarse or National Fine.



In principle, this gage functions as a split plug gage. The plug is collapsed by a thumb lever, inserted into the threaded hole, and allowed to expand. The apparent size of the thread is shown on a dial indicator. Interchangeable segments, which fit the handle mechanism, can be purchased to cover a wide range of thread sizes.

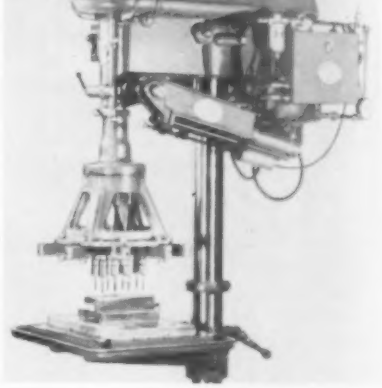
As stated by the manufacturer, actual tests show that this gage will check parts four to five times faster than the standard plug gage. For one thing, it is easier to use than the plug gage and will give a quantitative reading; also, it is 50 percent lighter than the old gage, weighing approximately 14 ounces. This redesigned gage is available at 40 percent of the price of the previous gage.

T-6-12

Air-Powered Feeds

An automatic air-powered Drill Press Feed, by the Beckett-Harcum Company, Wayne Road, Wilmington, Ohio, is designed to provide the proper thrust and correct drilling action for practically any size drill working in drillable material.

Operating features claimed include instant reversal of thrust on breakthrough; absence of hydraulic checking devices for light work; and accuracy of 0.001 in. maintained on depth control. Also, highly accurate tapping without use of a tapping head, and speed of stroke infinitely variable in either direction.



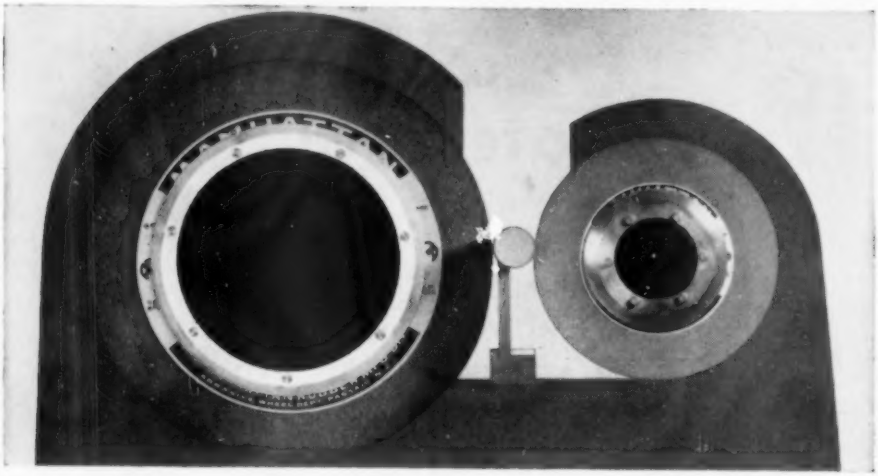
This highly flexible air feed operates on low pressures and with only moderate use of air. The unit is small, compact, said to be quickly installed and does not extend beyond the face of the drill press. Operation of the feed is either by a hand trip-rod or by a momentary contact foot switch, which leaves the operator's hands free to handle the work. Either continuous or single cycle operation can be employed.

The Beckett automatic drill press feed is available in either standard or heavy duty models in four feed types: drill; drill with dwell; drill, chip clean and dwell; and drill and tap. Models are designed to fit all drill presses having 1¼ in. pinion shafts and are readily adapted to shafts of other sizes. On standard models, maximum length of stroke is 2½ in. on 1¼ in. pinion shaft or 270 deg of shaft rotation. The standard feed develops from 4 lbs to 750 lbs. drill point thrust, while heavy duty feeds have a maximum length of stroke of 4 in. on 1¼ in. pinion shaft, or 445 deg of shaft rotation, and develop from 10 to 1250 lbs. drill point thrust.

T-6-13

Performance Proves the Quality of

MANHATTAN RUBBER BONDED CENTERLESS WHEELS



In today's market, the price and quality of your finished products are assuming more and more importance. Manhattan Rubber Bonded Centerless Grinding and Regulating Wheels insure heavier stock removal per pass, to close tolerances, and good finish. Therefore, by using Manhattan Wheels you improve the quality of your products and lower your costs.

CASE HISTORIES PROVE THE POINT

Example #1: 1015 CRS shafts — Hardened Rockwell "C"49, — 1" diam. × 20" long — .020 removal . . . Formerly, 5 to 6 passes were needed to maintain finish and tolerances. Manhattan 4660 F15KLE require only 3 passes to achieve same tolerances and improved finish.

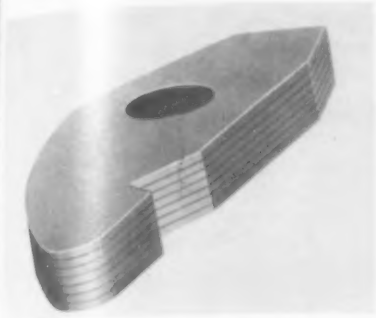
Example #2: Stainless Steel Collars — Soft — 2½" diam. x 1¼" long x 3/32" wall — .006/.008 removal . . . Unable to get satisfactory finish or production. Manhattan 4660 S13KLE — 3 passes to 20 RMS finish — 500 pieces per dressing. 600 pieces one pass per hour.

For help on your grinding problems, write to
ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION
PASSAIC, NEW JERSEY
RAYBESTOS-MANHATTAN, INC., Manufacturers of Brake Linings • Brake Blocks Clutch Facings • Radiator Hose • Fan Belts • Mechanical Rubber Products Rubber Covered Equipment • Packings • Asbestos Textiles • Bowling Balls Powdered Metal Products • • • • Abrasive and Diamond Wheels

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-76

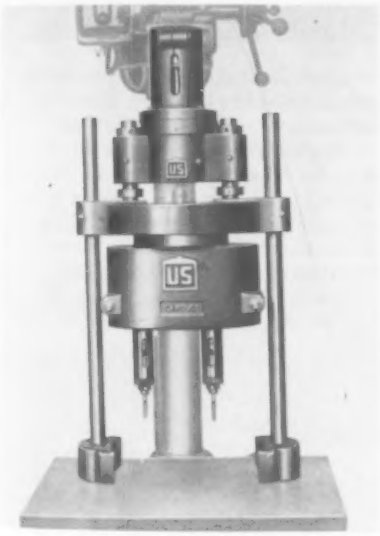
Laminated Cams



Technical Metal Processing, Inc., E. 55th St. at Lake Court, Cleveland 14, Ohio, announces a line of cams made of stamped steel laminations, stacked together and copper brazed into a single unit. Such cams are said to be approximately equal in strength to those made from solid steel, have a high degree of accuracy and may be heat treated by conventional methods. However, savings are substantial due to inherently low cost of production. **T-6-14**

Tapping-Drilling Head

Shown is a Drill Head, by United States Drill Head Co., Dept. S, 616 Burns St., Cincinnati 4, Ohio, mounted on a tapping unit for a machine that is not provided with a reversing spindle.



The tapping attachment, developed by U. S. engineers, is a compactly designed heavy duty non-sensitive unit requiring a minimum amount of space between the end of the drill press spindle and table. The drive is through a positive tooth clutch, and it is geared to reverse the taps at three times the tap feed.

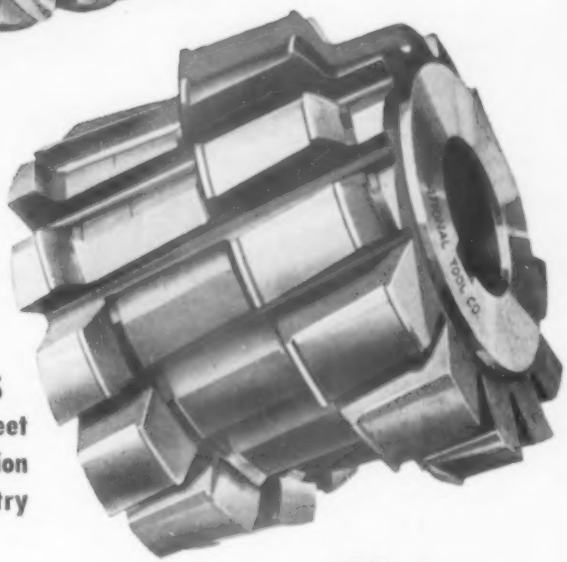
The attachment—here shown mounted on a 17 in. Delta floor type drill—is adaptable to any drilling machine, round quill or flange type spindle. By locking the tapping unit it can also be used for drilling. Can be equipped with single-purpose tap chucks, floating tap holders, or safety tap holders which permit bottom tapping with minimum breakage. **T-6-15**

For those tough *Special* jobs that just have to be right... depend on

NATIONAL TOOL CO.

Since 1905

engineers and manufacturers of high-quality special cutting tools for the metal-working industry



GEAR and SPLINE HOBS custom-engineered to meet the precision and production requirements of industry

A PARTIAL LIST OF *Special* TOOLS ENGINEERED AND MANUFACTURED BY

NATIONAL TOOL CO.
Cleveland 2, Ohio

Representatives in major industrial centers

Gear Shaper Cutters	Milling Cutters	Chamfering Cutters
Herringbone Gear Cutters	Broaches	Rotary Gear Cutters
Ground and Unground Gear and Spline Hobs	Tungsten Carbide Tools	Circular Form Tools
	Sprocket Cutters	Gang Cutters
Master Gears	Profile Form Mills	Flat Form Tools

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-77

STOP!

Running in Circles

YOU CAN WIN

- PAY INCREASES
- RECOGNITION
- PROMOTION
- MORE RESPONSIBILITY
- SUCCESS and SECURITY

BY STUDYING any phase of Tool Engineering

AT HOME!

There's a way you can attend the ALLIED INSTITUTE OF TECHNOLOGY now—right in your own home. You can learn various phases of tool engineering the practical way, the same way more than a thousand Allied students are following in Chicago.

Clip the coupon below, and check the courses in which you are interested. Full information will reach you shortly.

- ☐ Industrial Drafting
- ☐ Blue Print Reading
- ☐ Shop Math
- ☐ Tool Engineering Math
- ☐ Manufacturing Theory
- ☐ Jig & Fixture Design
- ☐ Gage Design
- ☐ Die Design
- ☐ Cutting Tools
- ☐ General Tool Engineering

These home study courses bring the famous Allied Institute of Technology right into your home. The courses are prepared by leading American Tool Engineering authorities, and are geared to supplement the work you are now doing. No tedious textbook reading is necessary. Your study is practical, and the courses combine instruction, reference and practice material in easy-to-read, direct lessons.

ALLIED INSTITUTE OF TECHNOLOGY, DEPT. TE-6
Division of Allied School of Mech. Trades
1338-42 S. MICHIGAN AVE.
CHICAGO 5, ILLINOIS

INDICATE A-6-78-1

Automatic Checking Recorder by Michigan Tool

An improved automatic checking recorder — Model MTR-1 — for obtaining permanent chart records of involute tooth forms, tooth spacing, leads, contours, and thread forms, is announced by Michigan Tool Company, Detroit 12, Mich. Designed primarily as an accessory to Michigan Sine-Line gear checking equipment, the recorder has many other useful applications. Up to 0.002 in. of error, both plus and minus, can be recorded automatically across the chart of this instrument.

Said to be outstanding among the improvements are a selective 2-speed chart drive and a standardized interchangeable precision electronic gage head, the later mounted in tandem with the indicator on a checker. Either one head can be used and transferred from one checker to another, or all checkers may be equipped with identical gage heads for plugging into the recorder as desired.

Accuracy of the new checking recorder has been improved by the all-electric 2-speed drive and improved pen mechanism, the movement of which is ⅛ in. per 0.0001 in. of checker indicator finger movement. Chart drives give ½ in. of travel for either 2 or 1 deg of work rotation. The electronic amplifier is designed to take care of normal voltage changes so that such fluctuations do not affect the instrument's accuracy.

Other advanced features of the Model MTR-1 include a convenient compartment in the base of the recorder for storing spare rolls, inks, and ink pad; a specially designed hand stamp for indicating what filing data should be filled in on each completed chart; and the use of a glossy-white interior finish which insures adequate lighting of all interior parts in case it should become necessary to service the recorder. A graduated handwheel is provided for manual operation when automatic operation is not desired. The recorder is portable, being mounted on hubber wheels. T-6-16

WHEN ACCURACY COUNTS...

Contact SCHERR!

TOOLMAKERS MICROSCOPE

FOR COORDINATE MEASUREMENT
4"x 2" AND PROTRACTOR OCULAR
IN MINUTES • TEMPLETS FOR ALL
STANDARD THREADS •
Smaller and Larger Sizes suitable for all shop requirements available

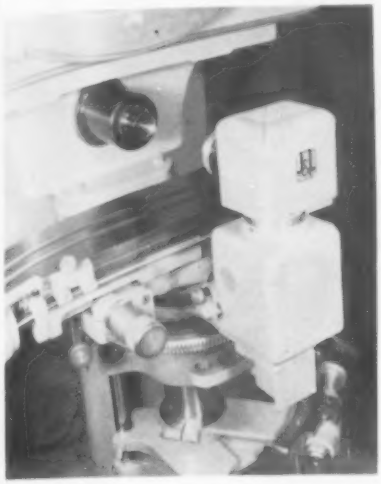
WRITE FOR ILLUSTRATED FOLDER

GEORGE SCHERR CO., INC.
COMPLETE LINE OF PRECISION INSTRUMENTS
200C LAFAYETTE ST. • NEW YORK 12, N.Y.

INDICATE A-6-78-2

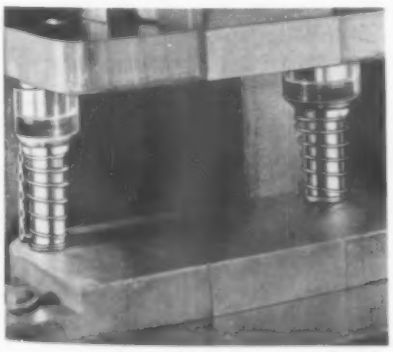
Intensity Illuminating Unit

The Jones & Lamson Machine Company, Springfield, Vt., is now supplying a high intensity Illuminating Unit on all J & L Model BC-14, PC-14 and PC-30 optical comparators. These units provide increased screen illumination, particularly at high magnifications. Shadow outlines are made even sharper than before and, thanks to the improved contrast, highly accurate readings can be obtained with less effort and with increased eye comfort.



The illustration shows the method of clamping the unit on the base and also the blower exhaust hole. The cooling unit operates when the lamp switch is turned on and draws a constant stream of air through the meshed port at the top of the lamp house. The entire lamp assembly thus is held at a constant normal temperature. **T-6-17**

Oilers For Die Sets



Longer life for pins and bushings, less down-time, and better die performance are claimed for Die-Co Oilers, a product of the Die Supply Co., 5349 St. Clair Ave., Cleveland 3, Ohio.

Each cup is made of clear plastic, molded to an aluminum insert that is fitted with a neoprene "O" ring. In turn, this prevents loss of lubricant and wipes abrasive dirt from the pins, keeping them clean and protected by a small amount of grease. Furnished with tapped hole for attaching chain to stop the oilers at correct height in cases where bushings leave the pins.

T-6-18

AMES

From Rubber Sheets to Sheet Steel

AMES
DIAL THICKNESS GAUGES
give impersonal, accurate results

FASTER

When you want to measure the thickness of either hard or resilient sheet materials you'll find one of these Ames Dial Comparators best for the job.

Ames No. 2 Dial Comparator is used for measuring non-yielding materials — sheet metal — hard rubber — glass. Compact and steady, it is ideal for bench use. The 2″ dia. table is adjustable to bring pointer to zero. Fingertip lever raises contact for rapid insertion of pieces. Release lever and read dial for a truly impersonal and accurate result.

Representatives in principal cities. B. C. AMES CO. *30 Ames Street Waltham 54, Mass.*
Mfgr. of Micrometer Dial Gauges • Micrometer Dial Indicators

Ames No. 2W Comparator is similar to the Ames No. 2 but is fitted with a dead weight for standard measuring of resilient materials — sheet rubber — paper — plastics — etc.

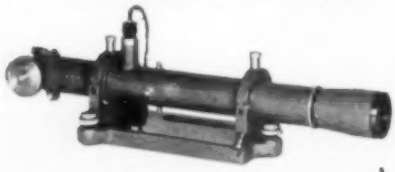
Both gauges are available with dial graduations in .001″, .0005″, .0001″ and .01 mm. Write for full details.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-79

ACCURATE!
.0015" AT 100 FEET
.000025" IN 10 INCHES
WITH
LIGHT BEAMS

- Weightless, No Deflection
- Positive, No Wear
- Universal, Portable
- Independent of Temperature

T.T.H. Alignment Telescope



Watts 18" Auto-Collimator

Also a complete range of optical shop tools including —

Gages to test angles to three seconds accuracy.

Projection type dividing heads and rotary table.

Tool makers and shop microscopes.

Write for free catalog.

ENGIS EQUIPMENT COMPANY
431 SOUTH DEARBORN ST.
CHICAGO 5, ILL.

INDICATE A-6-80-1

High Speed Turret Punch Press

The Wiedemann RA-41P Turret Punch Press for high speed piercing of such work as electrical panels, radio and television chassis, switchboards, and similar products, combines the pantograph for rapid hole location with the turret for quick access to punches and dies.

The turret of this machine, which was introduced at the recent ASTE Tool Show, carries 16 to 20 different punches and dies up to 3 in. diameter—round, square, shaped, or grouped. A handwheel, conveniently located at the operator, rotates the turret to quickly put any punch and die in piercing position. The work to be pierced is clamped to the cross slide in proper relation to a template in which ¼ in. dia. holes have been accurately located to correspond with the center of each hole to be pierced in the material.

By a simple coding arrangement, all template holes representing the same size punch can be connected by a colored paint line to form a visual "chain" for the operator to follow with the stylus. The free-moving stylus is guided by the operator from hole to hole in the template, which accurately positions the material under the ram. The press is automatically tripped, but only after the stylus point has positively engaged the template hole.

The press is designed to handle sheets up to 28 x 40 in.; its capacity is 15 tons pressure, with an $1\frac{1}{16}$ in. stroke of the ram which, operating at 175 strokes per minute, is powered by a 1 HP 3450 rpm motor. This combination of rapid material positioning and punch and die accessibility appreciably reduces piercing time of short and semi-production runs of sheet metal. Only one handling operation is usually required; close tolerances are maintained, and set-up time is reduced to its lowest terms.

Complete details are included in Bulletin 241 which gives actual time studies, clear-cut descriptions and pictures of methods of operation, and specifications. A copy may be had upon request to Wiedemann Machine Co., Dept. 34, 4272 Wissahickon Ave., Philadelphia 32, Pa.

T-6-19

THE SIMMONS SYSTEM

Latest System for accurately measuring 60° Threads. To within .001 just add chart constant to the thread O. D. and "mike" across the triangles to get the answer. As simple as that!

SHOP TESTED

Price only $8.60 f.o.b. Amarillo, Texas

Patented and Pending

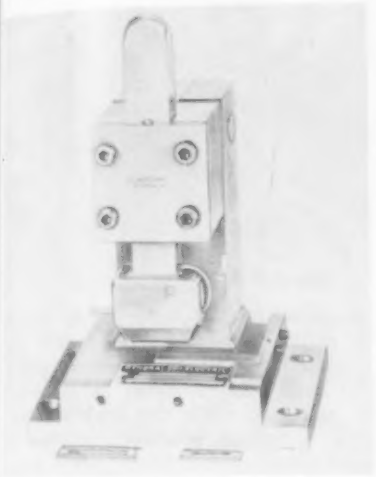
THREAD TRIANGLES
THREAD TRIANGLE GAGES

W. T. SIMMONS
BOX 1303 AMARILLO, TEXAS

INDICATE A-6-80-2

Hand Stamping Fixture

A hand Stamping Fixture for marking metal name plates is announced by the M. E. Cunningham Company, 169 East Carson St., Pittsburgh 19, Pa. Designated Model SF-100, this tool is made from the company's special Mecco safety steel to prevent spalling, mushrooming and injury to personnel. It can be fabricated to order for processing one or a group of name plates, checks and other flat metal objects.



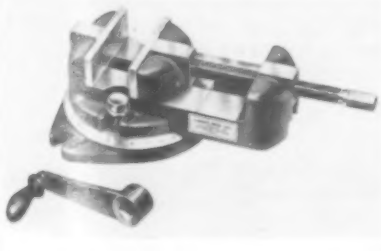
The chase section, in the bottom of the holder, has adjustable horizontal and vertical gages to facilitate stamping on any required panel. These gages are locked and adjusted by standard screws, and can be made in a variety of styles to suit round, square, rectangular and special shape plates.

A hardened and precision-ground type holder, having spring return, fits into the upper arm of the machine. The arm operates on a swivel which swings it upward when type is to be changed; thus, the holder does not have to be removed to change type. During striking operations a utility hook, which is easily removed for quick type changing, retains the type in the holder. **T-6-20**

Swivel-Based Vise

A 4 in. swivel-based Vise, announced by the Kenco Manufacturing Co., 5211 Telegraph Road, Los Angeles 22, Calif., incorporates a novel system of graduations which, reading from 0 to 90 deg, then back to 0, allow synchronized readings from markers on either side of the vise.

The removable hardened and ground steel jaws are 1¼ in. deep x 3⅝ in. wide x 5/16 in. thick. The vise opens to a full 4 in. and may be used independently of the base. Weight is 16 pounds. **T-6-21**



TURN STOREROOM AISLES

CONVENTIONAL SHELVING—6 AISLES!
SHELVING AREA—144 SQ. FT.
AISLE AREA—216 SQ. FT.

USING ROTABINS—2 AISLES!
SHELVING AREA—144 SQ. FT.
AISLE AREA—72 SQ. FT.

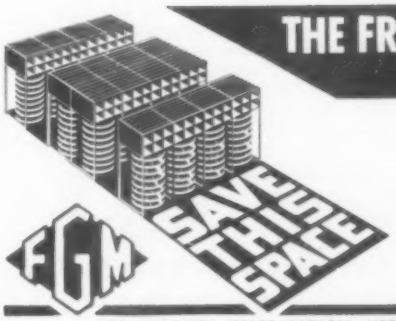
INTO EXTRA SPACE!

You can *increase* the storage capacity of your present storeroom area or you can *release floor space* for production facilities by applying Rotabin storage methods.

By mining the "gold" that's *in your plant* you can, in addition to obtaining extra floor space without building, reduce servicing time, waiting time and overhead to step up plant efficiency.

WRITE TODAY!

Send for Folder 220 which explains the Rotabin method, shows wide range of equipment; or ask for representative to call, without obligation.



THE FRICK-GALLAGHER MFG. CO.
WELLSTON, OHIO

Sales and Engineering:
420 Shubert Bldg.,
Philadelphia 2, Pa.

PIONEERS IN THE DEVELOPMENT OF ROTATING STORAGE EQUIPMENT

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-81

Tool and Die Design Training

Only ACME OFFERS THESE ADVANTAGES!

In less than a year, prepare yourself for a fine position in the ever-expanding tool and die industry.

- ACME training covers the whole field of tool and die design, including processing, estimating . . . laying out and detailing tools, jigs, fixtures, dies and gages of every description.
- ACME offers separate courses in tool design and die design for beginners who wish to specialize . . . *or for designers experienced in one subject,* who wish to learn the other.
- ACME training has been fully proved in practice, and is endorsed by industry. Hundreds of graduates are employed as designers, checkers, process engineers, chief engineers. Acme training is organized . . . it develops *better* designers . . . in a fraction of the time required by apprenticeship!
- ACME courses are prepared by experts, who know from actual experience just what training is necessary to secure and hold responsible designing positions.
- ACME copyrighted texts embody the largest and finest collection of drawings and formulas ever developed on tool and die design—a storehouse of designing information.
- ACME offers you a real opportunity, with a future . . . qualifies you in less than a year for a lucrative position in a growing industry. Individual training permits enrollment *at any time,* in day or evening classes—G.I. approved. Correspondence courses available. *Act now!*

ACME SCHOOL OF DIE DESIGN ENGINEERING

General Offices and Correspondence Course Division

129 WEST COLFAX AVE., SOUTH BEND 1, INDIANA

CALL IN PERSON, TELEPHONE, OR WRITE DEPT. 1, AT YOUR NEAREST ACME SCHOOL TODAY!

RESIDENT SCHOOLS

South Bend, Indiana 129 West Colfax Ave.	Dayton, Ohio 8 N. Jefferson St.	Detroit, Michigan 17 Brady Street
Chicago, Illinois 2804 W. Belmont Ave.	Richmond, Indiana Morton Center Bldg.	Los Angeles, Calif. 373 N. Western Ave.

Canadian Residents write Stewart E. Pineo, 1827 Jefferson Blvd., Sandwich East, Ontario

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-82-1

A SINGLE MOTION to Clamp or Release!

DANLY Kwik Klamp TOGGLE CLAMPS

. . . in your machine shop, press room or welding shop, Danly toggle action "Kwik Klamps" will reduce costly set-up time to a minimum. A quick thrust on the lever handle applies positive, controlled pressure and locks the work securely in place for any operation where pressures up to 750 pounds are satisfactory for clamping.

Twenty-six sizes assure almost universal application of standard "Kwik Klamps." A wide variety of base designs makes them ideal for numerous fixture and clamping operations. Write today for complete application data and specifications on Danly "Kwik Klamps." Danly Machine Specialties, Inc., 2240 South 52nd Avenue, Chicago 50, Ill.

DANLY

SEND FOR THIS BOOKLET

. . . and see how Danly "Kwik Klamps" will reduce work holding costs in your shop

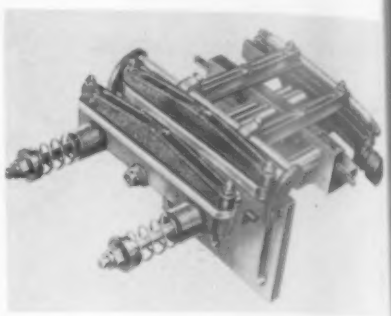
DANLY MACHINE SPECIALTIES, INC. • 2240 South 52nd Avenue, Chicago 50, Illinois

DIE SETS, TOOL, DIE, AND GAGE MAKERS' SUPPLIES

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-82-2

Automatic Stock Feeding

Several improvements, added to the Feedmaster Automatic Air Feed, have been announced by Great Western Tools Inc., 3811 Riverside Drive, Burbank, Calif. The Feedmaster operates on punch presses, spot welders, drill presses and other machines, feeding coiled or strip stock of almost any size and shape up to 18 in. wide and up to a 12 in. stroke.



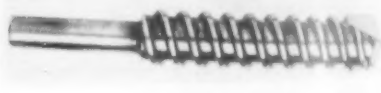
All movements operate pneumatically. An air-actuated feed head pulls the material through the machine and a hold head, also actuated by air, holds the material while the feed head returns to reload position. In order to insure positive movement of the stock, gripping capacity of the improved feed head has been materially increased. Springs added on the bar-supports now absorb shock load, improving over-all machine life. The hold head, which always operates in a fixed position, is now securely clamped to the bar supports—a rigid mounting said to eliminate all possibility of movement even over protracted use.

The Feedmaster is designed for efficient operation at over 200 strokes per minute with sustained accuracy. Simple operation is controlled by a cam-driven air valve, or it can be operated from the ram. It can be used with plain, compound, or progressive dies, mounting either on the die or to the machine, either side, front or back, push or pull, by means of the angle brackets provided. T-6-22

Cyclo-Twist Masonry Drill

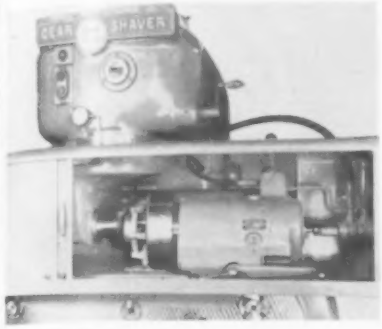
A carbide-tapped masonry drill is announced by the New England Carbide Tool Company, 60 Brookline St., Cambridge 39, Mass. Named the Cyclo-Twist, the tool embodies two spiral low-angle flutes which act as independent dust exits for both cutting edges. Being the same diameter as the cutting lips, the body of the drill provides maximum steel support for the carbide tips.

Advantages claimed are: no cleaning of hole; no stalling or slowing down while drilling; uniform drilling rate as dust is removed during drilling; lower temperatures, by reason of which the carbide tips stay sharp longer. T-6-23



Air Chucking for Gears

The use of a diaphragm air chuck, recently applied to internal gear shaving on Red Ring machines by the National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, Mich., greatly facilitates the shaving of planetary gear rings for automatic transmissions, among other applications.

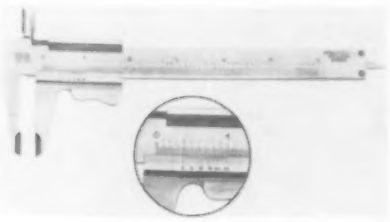


The air chuck not only reduces loading and unloading time, but acts to centralize the workpiece axially and thus tends to eliminate the difficulties of run-out. Besides, clamping action is fast and less fatiguing for the operator.

The diaphragm chuck is carried on the forward end of the internal shaving fixture, which operates on anti-friction bearings. A rotary valve, at the rear of the fixture, connects the air supply to the diaphragm piston. A coolant line serves the cutter directly. Operation of the chuck is controlled by a hand lever on the top of the fixture, and the fixture itself is advanced and retarded by hand levers at its bottom edge. **T-6-24**

Precision Vernier Calipers

Introduced to the American market by the Swedish Gage Company of America, 8900 Alpine Ave., Detroit 4, Mich., is the Tuna precision Vernier Caliper, a low-cost tool designed for internal and external measurements up to 5⅜ in.



Made of high quality Swedish steel, with all measuring surfaces hardened and ground and scales engaved to 0.001 in. graduations, the tool will compare favorably with more expensive vernier calipers. The sliding jaw is locked with a spring lock. **T-6-25**

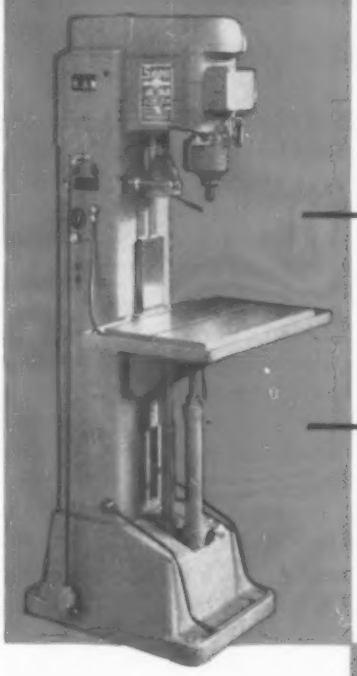
USE READER SERVICE CARD ON PAGE 73 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

Never Before

SO MANY ADVANTAGES for HIGHEST PRODUCTION

4800 PER HOUR!
3800 PER HOUR!
2500 PER HOUR!

For Top Production



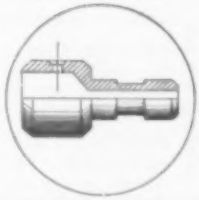
SNOW

FULL UNIVERSAL MACHINES

Air operated, electrically controlled Snow tools are establishing amazing production records daily on a wide variety of work. Just note these typical examples:

DRILLING

Crossdrill and C'T" Sink 1/16" Hole
Material—Brass
Production—4800 per hour
Fixture—#15 Vertical index
Equipment—#1-UD Drilling Machine

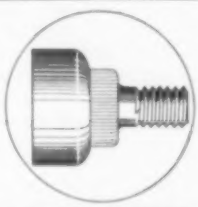


TAPPING

Tap Two #10-32 Holes
Material—Steel stamping
Production—3800 tapped holes per hour
Fixture—#14 horizontal index
Equipment—#1-UT tapping machine

THREADING

3/8"—24 Thread—1/2" Long
Material—Die Cast Aluminum
Production—2500 per hour
Fixture—#10 Drum dial
Equipment—#3-TR Threading machine



Snow air operated—electrically controlled machines have built in full universal controls that allow selection of the type of spindle cycle desired. This feature also permits instant synchronization of the standard Snow Master Fixtures. All types of air operated automatic and semi-automatic jigs and fixtures are carried in stock. Standardization permits low cost tooling—and—high production.

Sensitivity of power application prevents tool breakage.

Simplicity of control means that set up and operation can be handled by a less experienced operator with minimum fatigue.

SNOW

MANUFACTURING COMPANY
435 Eastern Ave., Bellwood, Illinois
(Chicago Suburb)

Single Spindle Verticals • Two-Spindle Verticals • Two-Spindle Horizontals • Automatic Nut Tapping Machines • Drill Press Tap Heads • Automatic & Semi-Automatic Jigs & Fixtures

Submit Sample Parts for Production & Cost Estimates

FOR FURTHER INFORMATION, USE READER SERVICE CARD: INDICATE A-6-83

Every TOOL ENGINEER *will want a copy of this* NEW BULLETIN!

... find out what 5,000 p.s.i.

HANNIFIN "HY-POWER" HYDRAULIC POWER UNITS

can do for **YOU**

HANNIFIN supplies everything you need to make "HY-POWER HYDRAULICS" work efficiently and dependably for you.

HYDRAULIC PRESSURE GENERATORS—The heart of the "Hy-Power" System! Up to 5,000 p.s.i. pressure at your finger-tip under exclusive automatic control. Capable of delivering hundreds of tons of useful force. (Illustrated above)

"HY-POWER" HYDRAULIC CYLINDERS—Built to work at various pressures up to 5,000 p.s.i. Heat treated alloy steel bodies with precision ground bore. Alloy steel rod, case hardened and ground. 9 standard sizes, 2" to 7¼" bore.

COMPLETE MACHINES—"Hy-Power" work units are easy to apply and use in machines of your own design or construction. Hannifin also offers a complete line of standard and specially designed units to meet users particular requirements.

"HY-POWER HYDRAULICS" now makes it practical for tool makers, machine builders, and design engineers to employ hydraulic pressures up to 5,000 p.s.i. under finger-tip control to solve innumerable manufacturing problems more efficiently and economically than ever before possible.

"HY-POWER HYDRAULICS" with its fast, automatic operating cycle offers manufacturing plants, large and small alike, almost unbelievable opportunities to reduce unit costs, save time, and improve the quality of work produced on a wide variety of riveting, punching, pressing, shearing, multiple punching, and multiple riveting operations.

For the complete story of "HY-POWER HYDRAULICS," see your local Hannifin representative or send for a copy of new Bulletin No. 150. "HY-POWER HYDRAULICS" is a remarkable engineering development pioneered by Hannifin. *Find out what it can do for YOU!*

ASK FOR NEW BULLETIN No. 150

HANNIFIN CORPORATION

1119 S. Kilbourn Ave. Chicago 24, Illinois

AIR CYLINDERS • HYDRAULIC CYLINDERS • HYDRAULIC PRESSES
PNEUMATIC PRESSES • HYDRAULIC RIVETERS • AIR CONTROL VALVES

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-84

Hand Knurling Tool

The Wade Tool Company, Waltham, Mass., has developed a "Two Way" Knurling Tool for hand use, designed specifically for easy knurling of long or slender work which might bend under normal knurling pressure.

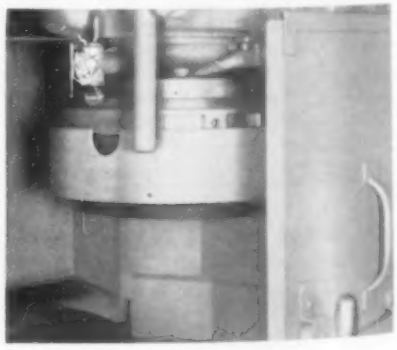
In principle, this tool is built like a steady rest. Two of the knurls revolve on stationary centers at the back of the work, and the third is adjusted by means of the screw handle. To operate, the adjustable knurl is backed off so the tool may be placed over the work. It is then screwed into the work, under great pressure, by turning the handle.

Novel features claimed for the tool, and which prompts its name, are: it can be operated in a stationary position, to make a narrow band of knurling; and it embodies an "automatic feed" so that, by swivelling the knurl to a very slight angle it travels along the work.

The C-type frame is a case-hardened steel forging. The tool is 7 in. over-all, has a work diameter capacity of ¾ in. maximum and 3/32 in. minimum. Knurls, made of an alloy tool steel selected for extreme toughness and hardness, are ½ x 3/16 in., with a 3/16 in. diameter hole. **T-6-26**

Solid Wheel Holder

The Blanchard Machine Company, 64 State St., Cambridge, Mass., announces a recently developed holder for cylinder grinding wheels, now available for the Nos. 11 and 18 Blanchard Surface Grinders. Specially designed spring clamps—3 for the No. 11, and 5 for the No. 18—are said to hold a wheel as securely and efficiently as sulphur. These Solid Wheel Holders eliminate sulphuring wheels into rings and require but a few minutes to change wheels. **T-6-27**



Bench Blast Cabinet

Operating on the compressed air supplied by a 5 HP, 2-stage garage compressor, a Bench Blast Cabinet, by the W. W. Sly Mfg. Co., 4700 Train Ave., Cleveland 2, Ohio, is designed for abrasive blast cleaning of small parts such as automotive pistons, dies, tools and castings.

The operator loads the parts through the top hinged cover and observes the work through the window in the cover. The operator, wearing rubber gloves, rotates the work in the blast stream, during which a ventilating fan draws off the dust which is retained in a removable filter bag. A side-mounted light provides adequate vision during blasting. **T-6-28**

Air Return Cylinder

An aid return Air Cylinder introduced at the ASTE Tool Show by Modernair Corporation, 4222 Hollis St., Oakland 8, Calif., is the product of a basically novel design. This improved double-acting cylinder may be operated by use of a 3-way valve and still allow throttling to provide for control of work and return stroke.

As claimed by the manufacturer, there is no residual pressure on the forward stroke. The return stroke is made at 60 percent efficiency with the use of a 3-way valve. After the initial charge of air, the cylinder operates on the same number of cubic feet of air as a spring return cylinder. In effect, it is a double-acting cylinder requiring only half the volume of air ordinarily needed.

Hard-drawn, relief-annealed brass tubing, a stainless steel piston rod and aluminum head construction combine to produce a cylinder lighter in weight yet designed for long service. **T-6-29**

GOOD TOOLS . . . Don't Cost Money They Make Money

FIGURING TOOL COSTS ON PERFORMANCE . . . NOT PRICE, PAYS BIG DIVIDENDS

Productivity—not pennies—is the only way to judge the cost of a tool. No tool deserves a place in your shop unless it can prove . . . on the job . . . that it will enable the machine to operate at peak performance, with minimum downtime.

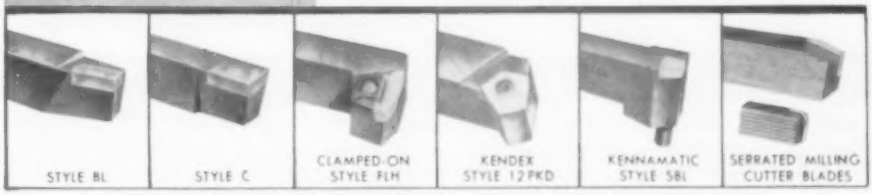
Kennametal cemented carbide tools are made by processes that are exclusive and expensive, but which are worth far more than the cost . . . because they assure a tool material of consistent soundness.

This Kennametal characteristic pays off—in your shop. In many instances, Kennametal tools will pay for themselves in savings effected in grinding, alone. And this does not take into account reduced tooling costs, and improved production rates attained.

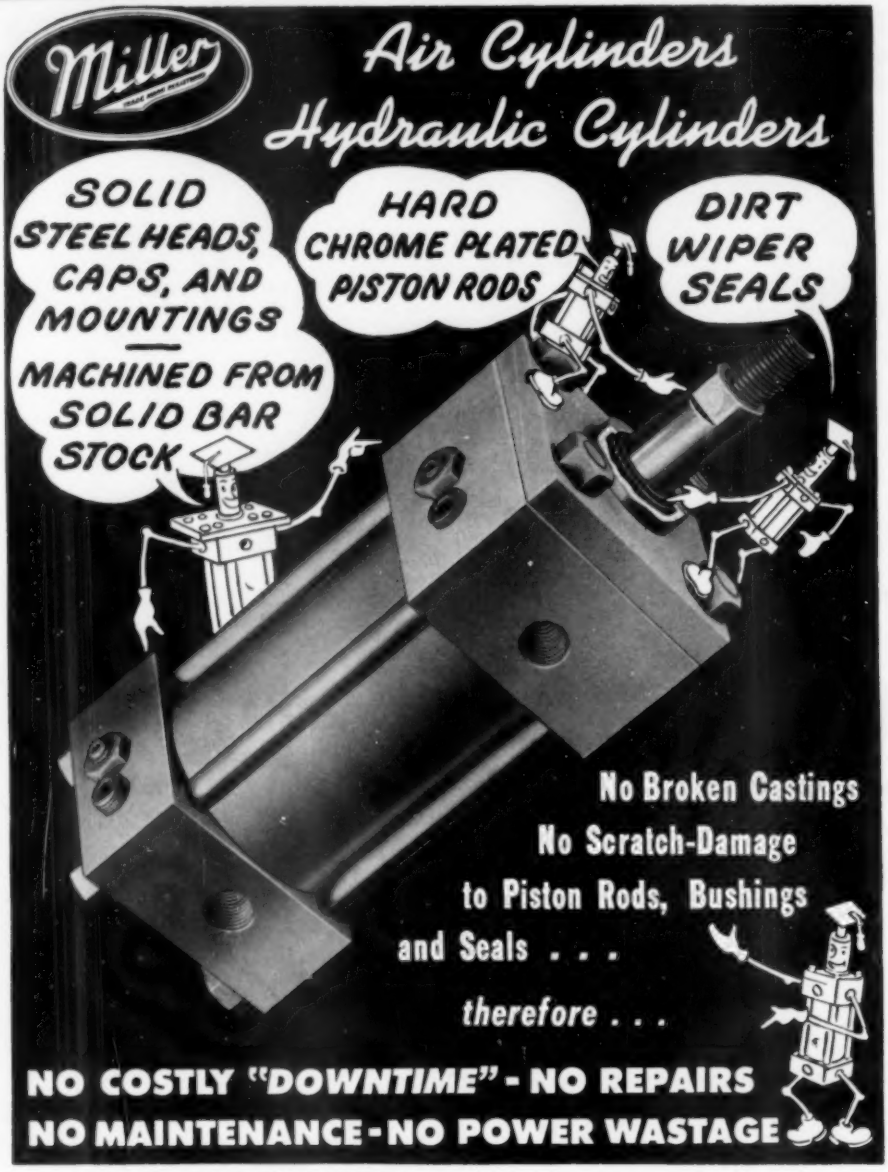
We'll send you, on request, reports that show cost reductions of thousands of dollars on many different operations through the use of Kennametal tooling. But—there is a much better way to demonstrate. That's in your shop, on your job. Ask us to do it.

KENNAMETAL Inc., LATROBE, PA.

MANUFACTURERS OF SUPERIOR CEMENTED CARBIDES AND CUTTING TOOLS THAT INCREASE PRODUCTIVITY



FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-85


Miller
Air Cylinders
Hydraulic Cylinders
SOLID STEEL HEADS, CAPS, AND MOUNTINGS — MACHINED FROM SOLID BAR STOCK
HARD CHROME PLATED PISTON RODS
DIRT WIPER SEALS
No Broken Castings
No Scratch-Damage
to Piston Rods, Bushings
and Seals . . .
therefore . . .
NO COSTLY "DOWNTIME" - NO REPAIRS
NO MAINTENANCE - NO POWER WASTAGE

SOLID STEEL HEADS, CAPS, MOUNTINGS. Dependable protection against the breakage that commonly occurs in "cast" cylinders when subjected to heavy shock loads in normal operation and when subjected to eccentric loads developed by cylinder misalignment. Eliminate "porosity" of castings. *Standard construction on all Miller Air Cylinders and Hydraulic Cylinders.*

HARD CHROME PLATED PISTON RODS. 90,000 to 110,000 psi yield point heat treated stress relieved steel accurately ground, polished, then *hard chrome plated.* Highly resistant to the nicks and scratches that commonly cause power wasting leakage. *Standard construction on all Miller Air Cylinders and Hydraulic Cylinders.*

DIRT WIPER SEALS. Wipe piston rods clean on every "in" stroke, protecting piston rods, seals, and bushings from scratch-damage by dirt, scum, abrasive particles. Easily replaceable. *Standard construction on all Miller Air Cylinders and Hydraulic Cylinders.*

Complete Line

- AIR CYLINDERS 1½" to 20" Bores
- LOW PRESSURE HYDRAULIC CYLINDERS 1½" to 12" Bores
- HIGH PRESSURE HYDRAULIC CYLINDERS 1½" to 12" Bores

Single and Double Acting, Single and Double Rod End, Spring Return, Cushioned and Non-Cushioned, Over-Sized Rod, and Long Stroke Cylinders in All Mounting Styles.

write for

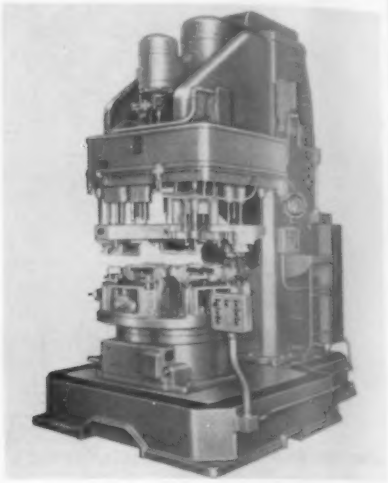
Miller Air Cylinder Bulletin A-105 and Miller Hydraulic Cylinder Bulletin H-104

MILLER MOTOR COMPANY
4025-27 N. KEDZIE AVE. • CHICAGO 18, ILLINOIS
AIR AND HYDRAULIC CYLINDERS - ACCUMULATORS - COUNTERBALANCE CYLINDERS - BOOSTERS - AIR HOISTS

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-86

Natco Automatic Holesteel

An automatic multi-operation Holesteel Machine, announced by the National Automatic Tool Company of Richmond, Ind., is designed to perform 2,700 operations per hour at each of four positions simultaneously—drilling, reaming, rough and finish counterboring, chamfering, spotfacing and tapping both sides of each part at the rate of 90 parts per hour.



The operator simply unloads finished parts at Station 1 and transfers parts from "A" to position "B" to complete both sides. The machining on both sides of the parts at four positions is simultaneous and completely automatic.

Operations in detail are as follows: Sta. 1, unload finished part from location "B", transfer part from location "A" to location "B", and load part in location "A". At Sta. 2 location "A", drill 8 holes 11/32 in. dia.; location "B", drill 3 holes ¼ in. dia., ream 1 hole 0.250/0.260 in. dia., and drill 1 hole for 10 x 24 tap.

Sta. 3, location "A", drill 3 holes 11/32 in. dia., drill 1 hole for 0.2465/0.2475 in. ream through, drill 1 hole for 11/16 x 16 tap; location "B", rough c'bore 1 hole 0.838/0.839 in. dia., and chamfer 1 hole. Sta. 4, location "A", ream 1 hole 0.2465/0.2475 in. dia., spotface boss 1⅛ in. dia., drill 1 hole for 0.250/0.260 in. ream, and drill 1 hole 11/32 in. dia.; location "B", c'bore 1 hole 2⅛ in. dia., drill 2 holes ¼ in. dia., and finish c'bore 1 hole 0.838/0.839 in. dia. Sta. 5, location "A", tap 1 hole 11/16 x 16, and tap 1 hole 10 x 24. T-6-30

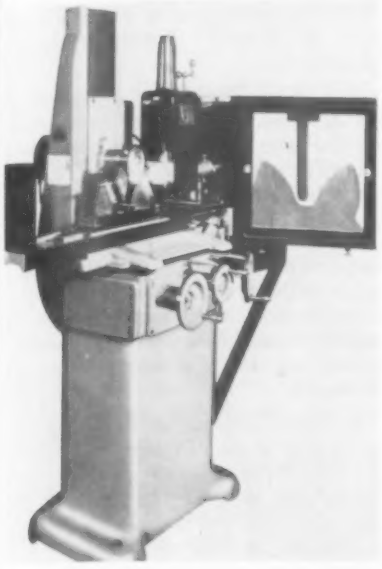
Putnam Tool Expands Line

Eleven new stock end mill types are announced by Putnam Tool Company, 2981 Charlevoix Ave., Detroit 7, Mich., an expansion of the Putnam line that now makes available a total of over 1000 types and sizes for immediate delivery.

Included is a Short Fluted Series, available in two and four flutes, single and double end designs, and in sizes up to ¼ in. This design is said to have greater rigidity, to be less subject to breakage, and can be used at faster feeds. T-6-31

Contour Grinding Machine

Three techniques in optical contour grinding—image, profile and template—are combined in a "Visual Grind" Contour Grinding Machine by the Cleveland Grinding Machine Co., 6514 St. Clair Ave., Cleveland 3, Ohio. The design is said to avoid involved setups, and to provide continuous inspection as grinding progresses.



A so-called "bounce-back" feature provides "reflecto-image" grinding. Light, emanating from the lamp house, is condensed into an olique reflection which directs the beams to the left against the front of the workpiece. The image, reflected horizontally to the right, passes through magnification lenses and is projected on the screen without inversion or reversal.

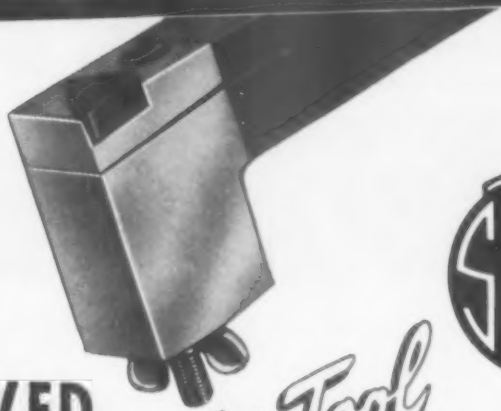
Profile projection is performed by placing an auxiliary mirror behind the workpiece. The light which carries past the work and grinding wheel is reflected back to the ground glass screen, on which the profile of the work shows as a dark, sharp image without indistinct edges. The profile method is applicable for work in which the front and rear surfaces are alike in size and shape.

The template technique combines reflecto-image and profile projection. A polished, precision template of correct shape is fastened in front of the workpiece, when "photographs" of both are projected on the screen simultaneously. The workpiece is then ground accurately to desired form by matching its magnified image with that of the template. No drawing need be scribed on the screen. The machine is fully described in company literature. **T-6-32**

USE READER SERVICE CARD ON PAGE 73 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

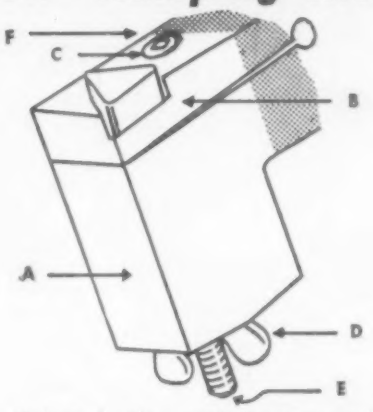
NEW *Chrome plated* HOLDERS

-UP TO 500% MORE LIFE



IMPROVED *Ejector Tool* DESIGNS

New Clamping Method — Lower Prices



A. Hard chrome plate gives up to 500% longer wear by eliminating chip erosion.

B. New clamping device gives controlled locking and stress-free carbide insert support.

C. Easily accessible clamp locking screw for fast and easy blade interchange.

D. Wing nut locks adjusting screw. No wrench required.

E. Knock-out hole for easy carbide insert removal.

F. No offsets nor excessive overhangs. Permits adjacent set-up of holders.

Selected alloy steel, heat treated, and hard chrome plated, combined with quality SUPER workmanship gives you a holder that resists distortion and scoring. The broached holes fully enclose and support the carbide inserts.

No separate parts or clamping devices to become lost or to cause other complications.

WRITE FOR THE NEW SUPER CATALOG

SUPER TOOL COMPANY
21650 HOOVER ROAD
DETROIT 13, MICHIGAN

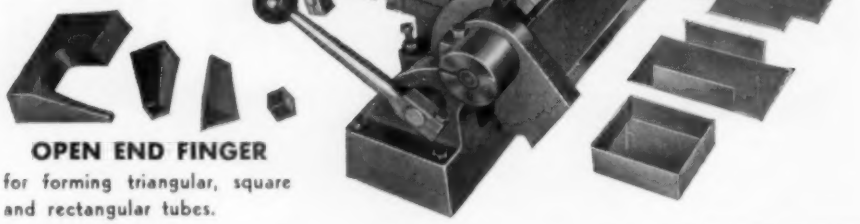
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-87

New! di-acro BOX FINGER BRAKE

Four models 6" 12" 18" 24"
Capacity—16 Gauge Steel

3 TOOLS IN ONE

1. BOX and PAN BRAKE
2. STANDARD BRAKE
3. BAR FOLDER



OPEN END FINGER
for forming triangular, square and rectangular tubes.

Versatility from the word GO!! One box or 10,000—can be economically produced with the new Di-Acro Box Finger Brake. The complete box finger bar also serves perfectly for all standard brake operations. An Acute Angle Bar—quickly mounted—converts the brake to a bar folder for locks, seams, hems and sharp angles. The unique Di-Acro Open End Finger forms square or triangular tubes and other similar parts difficult to make. Real machine tool construction, with hardened and precision ground box fingers, assures permanent accuracy in producing duplicated parts. The Box Finger Bar can be easily mounted on all standard Di-Acro Brakes.

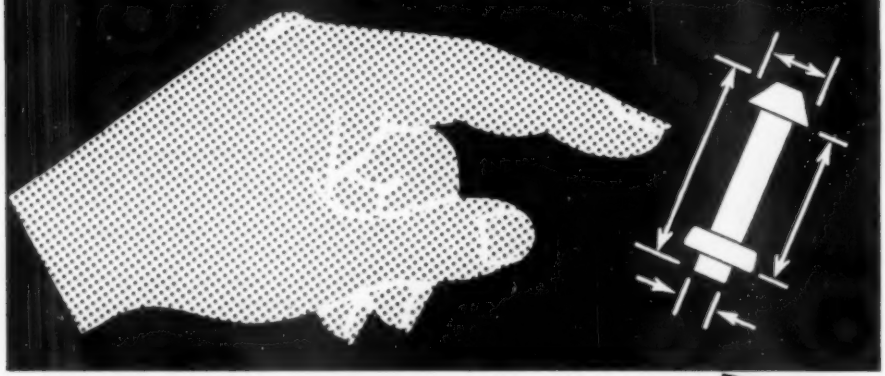
Send for
40 PAGE CATALOG
describing DI-ACRO Shears, Punches, Benders, Brakes, Notchers and Rod Parters,—also Power Shears and Benders.

Di-Acro is pronounced "DIE-ACK-RO"

DI-ACRO PRECISION MACHINES DIE-LESS DUPLICATING

O'NEIL-IRWIN MFG. CO.
375 EIGHTH AVENUE, LAKE CITY, MINN.
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-88-1

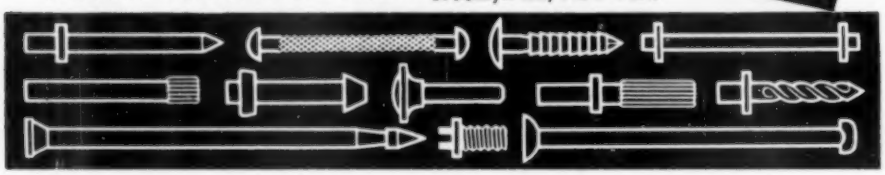
SPECIFY Hassall
specially engineered fasteners



Hassall cold-headed fasteners can improve your products and save you money, even on short runs. Send us your specifications for your nails, rivets and screws . . . in diameters from 1/32" to 3/8" . . . lengths up to 7" . . . in any workable metal . . . in practically any finish. Your inquiry will be handled promptly. Ask for free catalog.

JOHN HASSALL INC. 130 Clay Street Brooklyn 22, New York

SPECIAL NAILS RIVETS SCREWS
Hassall



FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-88-2

TECHNICAL SHORTS...

OPERATING ON THE PRINCIPLE that X-rays can be reflected from polished surfaces as can visible light, an X-ray microscope, which makes visible internal details of materials through which light cannot pass, has been developed at General Electric Company's laboratories.

According to company announcement, the new instrument may compete with electron microscopes, the most powerful magnifying instruments in use at present. The X-ray microscope does not require that samples under study be in a high vacuum as does the electron microscope. Thus it may become possible to examine living materials at much higher magnification than ever before. At the present stage of development, magnifications of 100 diameters have been produced.

The unit consists of an X-ray tube and a pair of curved mirrors which the X-rays strike after having passed through the sample. The mirrors, in this case platinum-coated slabs of fused quartz, acting as a convex lens with a light beam, bend the rays in such a manner as to form a magnified image of the sample on a photographic film.

The board of directors of Allegheny Ludlum Steel Corp. has approved a $23,600,000 plant improvement program, supplementing the present $30,000,000 program nearing completion, to keep the company's production facilities and manufacturing improvements up-to-date.

Improvements include a new hot strip mill and additional cold rolling facilities at the Brackenridge plant and additional cold rolling equipment at the neighboring plant at West Leechburg.

In addition, the plan calls for the erection of a research laboratory providing facilities for all phases of metallurgical research into high alloy and other specialty steels.

The entire program is scheduled for completion during the next three years.

An electronic torch hot enough to cut holes in firebrick or to melt tungsten has been developed by scientists of the General Electric Company's research laboratory. High frequency radio signals of one billion cycles per second are produced by an electron tube, a "megnetron." From the tube, an antenna of two short metal cylinders extends from the tube and a high-frequency arc is made to form at the end of the antenna. Certain gases then are fed past the arc and

the electronic torch results—producing temperatures higher than the melting point of tungsten, 3370 deg C.

According to Dr. J. D. Cobine, G-E scientist, the high temperatures produced on any surface placed in the jet are caused by the heat generated as atoms join together to form molecules. The molecules of the gases are broken up into atoms by the high frequency arc, to join together again on surfaces placed in the torch.

The Joseph B. Kushner Electroplating School is offering three intensive one-week summer lecture courses in special electroplating subjects for persons interested in an opportunity to study during part of their vacation time.

The courses, which will be conducted by Mr. Kushner, personally, are scheduled as follows: week of August 6, "Modern Electroplating Principles;" August 13, "Gold Plating Techniques and Problems;" August 20, "Recent Developments in Electroplating." A tuition fee will cover enrollment and text material.

Enrollments and accommodation reservations should be placed by July 15 to Mr. Kushner, Director, Joseph B. Kushner Electroplating School, 115 Broad St., Stroudsburg, Pa.

A treatment for polystyrene, said to be inexpensive and easily applied, is now offered as a liquid which, when applied, prevents the attraction of dust. The material, called "Logo Stat," is applied by dipping, thus requiring no special equipment.

According to its makers, Bee Chemical Co., 13799 S. Ave. "O," Chicago 33, the solution, which may be applied immediately after molding to prevent dust accumulation during handling, dries rapidly and is not water soluble following application. However, it may be removed by ordinary soap and water when desired. The coating is not a wax and is said to be unnoticeable.

Normal subsequent painting is possible, too, when a pigmented product, made by the same manufacturer, is used.

A recent innovation at the Westinghouse Electric Corporation's Lighting Division is the "smog box" in which outdoor lighting units are given the equivalent of 20 years' weathering in approximately 1,000 hours. The metal fixture is placed inside a heated cabinet where a salt fog has been produced by atomizing a 20 percent salt solution to simulate the effect of seashore salt air or the sulfur-content air of an industrial area.

A NEW WAY TO CUT PANEL COSTS

From flat stock to → *Vulcan-draw* = *one corner formed*

Rotate the sheet forming one corner at a time . . . overall specified dimensions are held . . .

For medium production schedules you draw one corner at a time . . . eliminate costly draw dies . . . eliminate costly notching, hand welding, and finishing . . . Use simple corner punch and die for all sizes with the same corner radius . . . switch in a few minutes to a similar die for a corner of different radius.

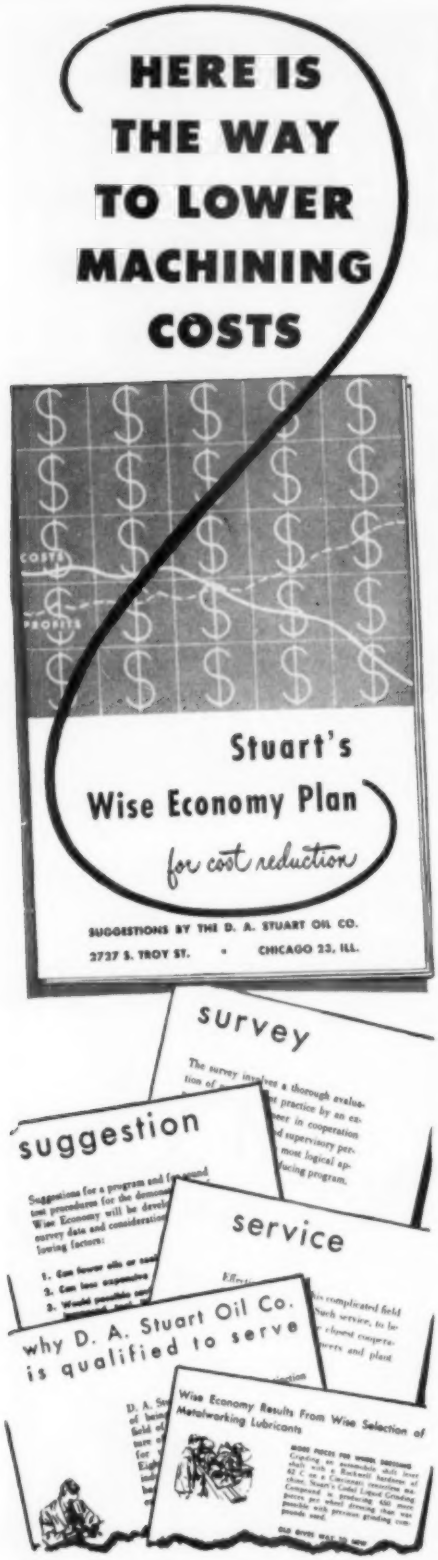
You further cut costs by releasing punch press equipment for other work. Most any radii and any panel size from 15" x 18" up to the largest panel can be handled in the Vulcan-draw . . . A pedal starts a few-seconds hydraulic cycle producing a corner completely drawn and finish sized . . . Rotate the sheet and you get all corners with overall panel dimensions held . . . Former cost per corner and per finished panel is cut to fractions depending on the number and variety of short or medium run jobs to be done.

Vulcan has
Designed and Built
Dies
Tools
Machines
Fixtures
Equipment
Since 1916

We will gladly forward additional information if your request includes your present panel part prints for our immediate proposal or recommendation. This will cover the Vulcan-draw, the corner dies, and all needed brake press, corner trim, and return flange dies to make fully finished panels at reduced cost. Present Vulcan-draw deliveries approximately 16 weeks.

VULCAN TOOL CO., Pritz and Lorain Ave., Dayton, Ohio

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-89



NOT just another spot check "oil survey", the Stuart plan is a scientific appraisal of a plant's over-all cutting fluid needs. Ask for details.

D.A. Stuart Oil Co.

2729-49 S. Troy St., Chicago 23, Ill.

INDICATE A-6-90

A.S.T.E. News

(Continued from Page 68)

Situations Wanted

ENGINEERING EXECUTIVE — 43, experienced in supervising production in various types of machine and machine tool manufacturing. Background includes sales, sales engineering and field service work. Received technical education in Great Britain and U. S. Available in Cleveland area. Box 210, American Society of Tool Engineers, 10700 Puritan Ave., Detroit 21, Mich.

GRADUATE ENGINEER—With B.S. in Mechanical Engineering and Administrative Engineering, desires position in design and development, production control, plant layout, or manufacturing processes. Served as draftsman with U. S. Army. Unmarried, no dependents. Will accept foreign employment. Box 209, American Society of Tool Engineers, 10700 Puritan Ave., Detroit 21, Mich.

GRADUATE M. E.—30 years' practical experience (19 years in supervision) in production, tooling, process, development, and shop relations. Age: 49. Licensed Professional Engineer. Permanent position with progressive concern desired. Location: South Bend, Ind., or vicinity preferred. Box 213, American Society of Tool Engineers, 10700 Puritan Ave., Detroit 21, Mich.

GRADUATE MECHANICAL ENGINEER—Age 29. Experienced methods and procedures analyst, and tool designer. Well acquainted with manufacturing methods, metallurgical research and testing processes, and inspection. Served apprenticeship as machinist and toolmaker. Location—preferably in the East. Detailed resume on request. Box 212, American Society of Tool Engineers, 10700 Puritan Ave., Detroit 21, Mich.

PRODUCTION TROUBLEMAN—Experienced in methods engineering, processing, and design error corrections. Supervision considered. Box 211, American Society of Tool Engineers, 10700 Puritan Ave., Detroit 21, Mich.

Nelson Retires

Chicago, Ill.—After 36 years of continuous service to industry in the building of special machinery, tools, jigs, fixtures and machining of parts, Harry Nelson of the Chicago ASTE chapter is retiring.

For more than two decades Mr. Nelson has been vice-president, secretary and general manager of the Charles L. Anderson Machinery Co. Earlier he was associated with local branches of several national concerns. After several months' rest he may make another connection or establish a shop of his own.

Mr. Nelson has been active in Chicago chapter for a number of years. Currently he is chapter delegate.

Abrasive Plant Host To Worcester Group

Worcester, Mass.—On April 4 some 70 members of Worcester chapter visited the Norton Co., to watch abrasive wheel manufacture, from the mixing of grain and bonding materials to testing of the finished product. Then the party proceeded to the Machine Division where the latest types of grinding machines were viewed in various stages of manufacture and assembly.

Following the tour, dinner was served to about 120 in the administration building dining room, followed by a technical session in the Norton Memorial Hall.

Wallace T. Montague, company vice-president, presided and introduced the first three speakers. Walter G. Johnson, assistant chief engineer of the Machine Division, discussed "Twin Flo Grinding," illustrating with slides.

Osgood J. Whittemore of the Research Laboratories told of the "Top Temperatures" used in preparing certain refractories, and Maxwell Wheildon, another member of the laboratory staff, described "Wear-Resistant Products" that have become companion or by-products of abrasives and refractories.

Fred L. Curtis, manager of the Abrasive Sales Engineering Division, introduced Sales Engineers Gordon T. Rideout and Robert G. Van Keuren, who related a graphic story of the "Influence Of Abrasives" on the daily life of His Majesty, The Boss of the House.

A Norton sound film, "32 Alundum, the Revolutionary Abrasive," was followed by a question period. Abrasive products were on display for informal discussion after Carroll L. Morse, chapter chairman, closed the meeting.

* * *

About 75 members met May 2 at Putnam & Thurston's Restaurant to hear J. L. Schwab, vice-president of the New England Division, Methods Engineering Council, Bridgeport, Conn., explain "Methods-Time Motion," better known as M-T-M, and its relation to proper tool design. Mr. Schwab's talk has been reported in earlier isues of *The Tool Engineer*.

Chairman Morse presided over a business meeting when Past Chairman Carl D. Schofield, chapter delegate, reported on the recent Philadelphia convention. National Director Victor H. Ericson spoke briefly on national society affairs. Vice-Chairman Ralph A. Baker introduced the speaker.

Eulitz Wins Promotion

South Bend, Ind.—Arthur H. Eulitz of South Bend chapter has been appointed assistant to John M. Scott, recently named head of die engineering and maintenance at Studebaker Corp., P. O. Peterson, vice-president in charge of manufacture, has announced.

A 35-year veteran with Studebaker, Mr. Eulitz joined the organization as a diemaker. He did wartime service as night superintendent of the aviation plant.

Obituaries

Leonard G. Kiefel

One of Detroit chapter's younger executives lost his life in an automobile accident, when his car skidded into a bridge abutment near Sycamore, Ill. Leonard G. Kiefel, 34, sales engineer for Sheldrick Mfg. Co., Upper Sandusky, Ohio, was instantly killed, March 1, while driving to Rockford, Ill.

He had been an active worker in the chapter ever since joining the Society in 1947. For the past two years he had headed the Publicity Committee.

Born and educated in Detroit, Mr. Kiefel received his mechanical engineering degree from Lawrence Institute of Technology. Prior to studying engineering he was a licensed funeral director and mortician. He was employed at Chevrolet Engineering Laboratories and by The Cross Co., Detroit, before joining Sheldrick Mfg. Co. in 1947.

He was member of the Engineering Society of Detroit and of several Masonic orders.

Frank A. Hughes

Frank A. Hughes, 49, chief sales engineer, Bay State Abrasive Products Co., Westboro, Mass., died February 12 at Memorial Hospital in Worcester from injuries suffered when struck by an automobile the night before.

Mr. Hughes was returning from the Westboro Country Club and stepped out of his car to guide a friend across the highway through a thick fog when the accident occurred.

A native of Worcester, the ASTE'er was a member of the class of 1922 at Worcester Polytechnic Institute, and served in World War I. He was also affiliated with the junior executive committee of his company and with Masonic organizations.

John D. Rovick
Esta Marker

Muncie chapter recently lost two members, when John D. Rovick, field engineer for Michigan Tool Co., and Esta Marker, tool engineer for Warner Gear Co., passed away.

As charter chairman of the chapter, Mr. Rovick guided the ASTE group through its first year. He was born at Detroit 59 years ago and studied at Michigan State College.

Mr. Marker, who had spent a number of years in the field of production tools, served his company in the capacity of broach specialist. He was an enthusiastic worker for his ASTE chapter.

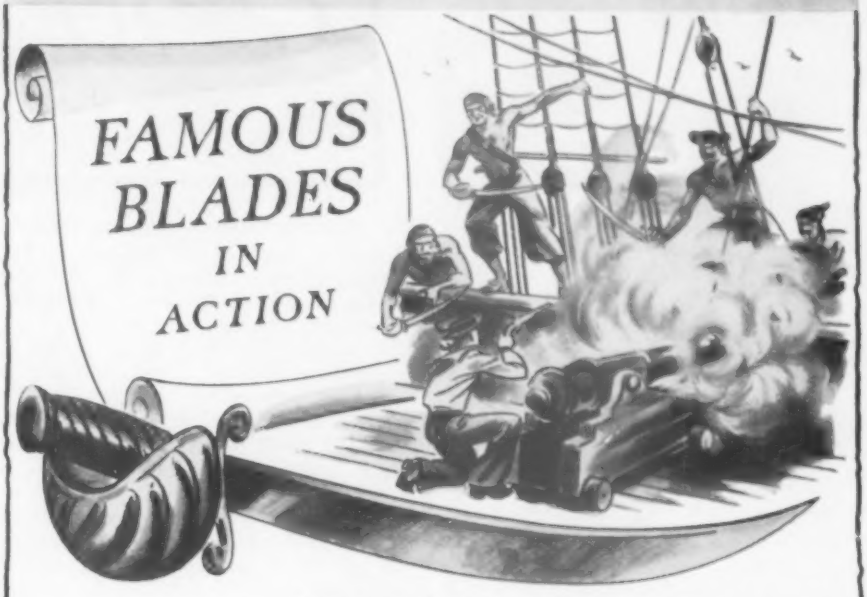
Jacob F. Aschinger

Jacob F. Aschinger, 58, tool supervisor of the Lycoming Div., Avco Mfg. Corp., Williamsport, Penna., died suddenly, March 4.

A veteran of more than 40 years with this firm and its predecessors, Mr. Aschinger had served in several capacities.

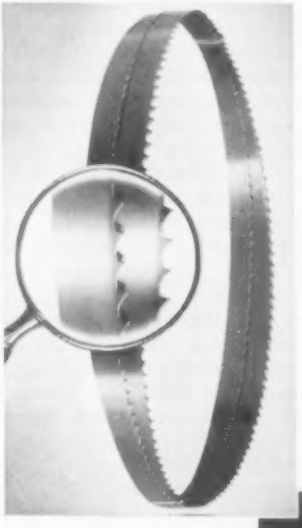
Born in Williamsport and educated in the public schools there, he had been a member of the Williamsport ASTE chapter since 1942.

W. O. BARNES METAL CUTTING SAWS



The CUTLASS

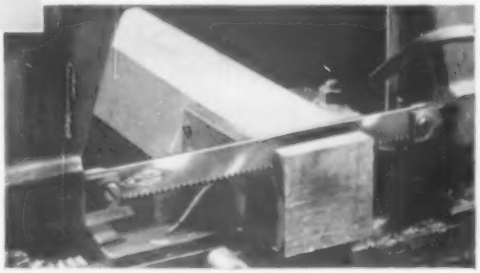
Strongly back-edged and heavy, the Cutlass was an efficient tool whether it was used in battle or to clear storm tangled wreckage. Ships no longer carry these famous blades and the history of progress must record a loss to man and boy who thrill to tales of piracy and adventure.



BARNES SAW BLADES

RUGGED EFFICIENT DEPENDABLE

Progress in the craft of making metal cutting saws has resulted in the out-moding of many of our methods of metal separation—and greatly improved the efficiency of tooling and fabrication in modern mass production. Barnes blades—famous for their dependability—are the result of over 30 years of research and improvement—and there's a dependable Barnes saw blade for every metal cutting purpose.



The special tooth form of Barnes "Skip Tooth" blade prevents clogging or loading at high speeds or heavy feeds. The "Skip Tooth" is used for precision and production cutting of soft non-ferrous metals, wood and plastics.

Whether you use Barnes Band Saws, Hand or Power Hack Saws—Your Industrial Distributor is a convenient source of supply and information. He will help you select the right Barnes Blade for the Job.

DETROIT BARNES EST.
Established 1919

W. O. BARNES CO., INC.
1297 TERMINAL AVE. · DETROIT 14, MICH.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-91

Tempilstik°

the amazing Crayons that tell temperatures

A simple method of controlling working temperatures in.

- **HARDENING**
- **TEMPERING**
- **HARD-FACING**
- **STRAIGHTENING**
- **WELDING**
- **HEAT-TREATING IN GENERAL**

It's this simple. Select the Tempilstik° for the working temperature you want. Mark your workpiece with it. When the Tempilstik° mark melts, the specified temperature has been reached

$2 each

gives up to 2000 readings

Available in these temperatures (° F)

113	263	400	950	1500
125	275	450	1000	1550
138	288	500	1050	1600
150	300	550	1100	1650
163	313	600	1150	1700
175	325	650	1200	1750
188	338	700	1250	1800
200	350	750	1300	1850
213	363	800	1350	1900
225	375	850	1400	1950
238	388	900	1450	2000

Also available in pellet or liquid form

FREE —While we cannot supply free Tempilstiks°, we will be glad to send you sample Pellets or sample Tempilaq° (liquid form) for trial under your actual working conditions. Be sure to state the temperature of interest to you.

Tempil° corp.
132 WEST 22nd STREET
New York 11, N. Y.

INDICATE A-6-92

GOOD READING

A GUIDE TO SIGNIFICANT BOOKS AND PAMPHLETS OF INTEREST TO TOOL ENGINEERS

ENGINEERING MECHANICS, by Archie Higdon and William B. Stiles, respectively Professor of Theoretical and Applied Mechanics, Iowa State College, and Professor of Engineering and Associate Director, Engineering Experiment Station, University of Arkansas. Published by Prentice-Hall, Inc., New York; 505 pp. Price $6.25.

This book, which is written in collaboration with Arthur W. Davis and Herbert O. Ustrud, Assistant Professors of Theoretical and Applied Mechanics, Iowa State College, with foreword by Prof. H. J. Gilkey, head of this department at Iowa State, is the first publication in Prentice-Hall's recent Civil Engineering and Engineering Mechanics series, edited by Prof. N. M. Newmark of University of Illinois.

The work may be considered a "philosophical" approach to the theme, in which major problems have been placed in the free body diagram. Thus, the student may visualize each step of the analysis and solving of problems.

Essentially, Engineering Mechanics is a basic text for a two-semester course, stressing the fundamental principles of engineering mechanics and the development of ability to apply them. However, specific suggestions for a one-semester course are also outlined.

Emphasis is placed on statics and dynamics and, wherever possible, an action is illustrated by the use of free body diagrams or other pictorial and semi-graphic aids. These supplement, rather than replace, the application of elementary calculus. There are over 1100 problems of which 100 are set up as illustrative examples, and the appendix includes answers to the even-numbered problems, sample one-hour tests, and several two-hour final examinations.

GRINDING PRACTISE, by Fred H. Colvin and Frank A. Stanley, published by McGraw-Hill Book Company, New York. Third edition, 419 pp., indexed and illustrated. Price $3.75.

This revision by veteran authors covers the field of abrasive wheels and grinding machines, shows what they do, how they are operated and further suggests best ways of use on various types of work—in brief, the advantages in production economy that accrue from use of the right machines and methods.

The edition, in which data is arranged for ready reference, includes the recent standard capacity for cylindrical grinding machines, the latest safety code for grinding wheels and method of marking grinding wheels which has now been adopted by all makers of abrasive wheels.

In addition, it includes useful information on the use of diamond abrasive wheels and on wheels for cutting-off work, with complete details as to speeds, wheel selection and wheel life as well as use of small mounted wheels and abrasive points. It further covers precision grinding to millionths of an inch; the grading of diamond powder for lapping; and surface finishing by honing and superfinish.

MACHINE TOOLS FOR ENGINEERS, by Charles R. Hine, Assistant Professor of Manufacturing Processes, Rensselaer Polytechnic Institute. Published by McGraw-Hill Book Company, New York; 550 pp., illustrated. Price $3.50.

This is the first of two volumes on manufacturing processes envolved from courses developed at Rensselaer Polytech. A second volume—on casting and forming—is in preparation. The current book introduces the student to the fundamentals of machine tools and production processes and also covers the more important machining processes.

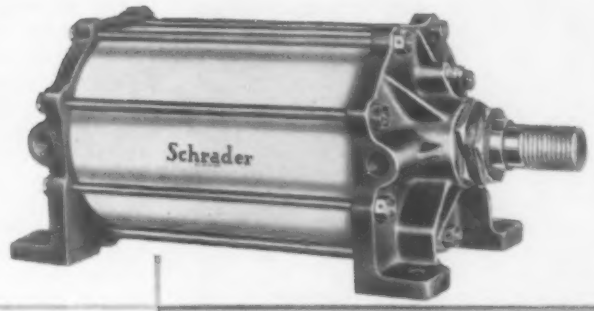
Taken as a whole, the text is unique in that it presents the production side of machine tools from the standpoint of the engineer, whose view of machining operations would differ from that of the shop man who is primarily interested in developing skills rather than a grasp of manufacturing processes.

PUNCHES AND DIES, By Frank A. Stanley, published by the McGraw-Hill Book Company, New York. 583 pp., indexed and profusely illustrated. Price $4.75.

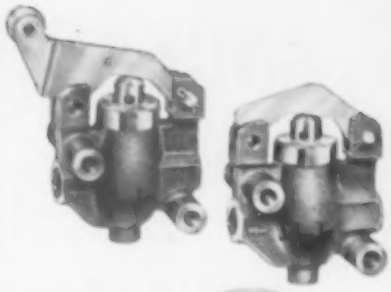
This fourth edition covers modern punch and die work and includes the practical fundamentals, layout, construction and various uses of punches and dies for specific types of work. The material, arranged in eight sections, provides a quick reference and guide to practical machine shop methods.

The book is replete with specific information covering development of die design; the use of metals stampings in lieu of expensive forgings and castings; data on sectional dies and big press work; and examples of hydraulic presses used for cutting and stamping.

A considerable part of the work has been devoted to blanking operations and the use of cemented carbide dies in blanking, notching, forming and cutting operations. In addition, there is analysis of rules for shell drawing, and the drawing of stainless steel, monel, aluminum, nickel and magnesium base alloys. In all, the book implies an authoritative guide to problems related to modern punch and die work.

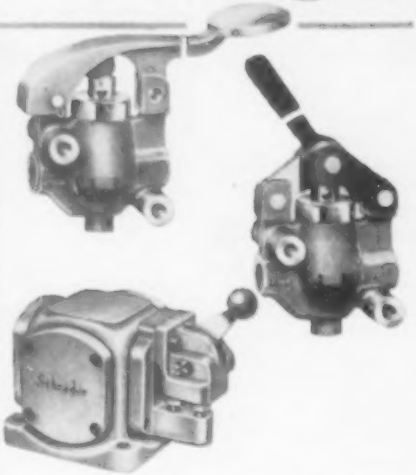


CYLINDERS All types. Single acting, push or pull. Double acting, with or without cushion. Bolt, base, leg or flush mountings. Cylinder diameters 1" to 8". Any stroke.



EVERYTHING
you need for designing
AIR HOOK-UPS
or solving
AIR CONTROL PROBLEMS

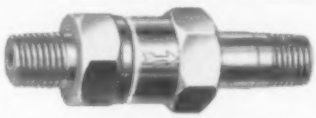
NEW AIR CLAMPS Bantam-sized units for delivering a powerful push stroke. Variety of sizes and two mountings for almost every clamping application.



OPERATING VALVES Here are only a few of the 2, 3, and 4-way Schrader valves for you to choose from. Many others for hand, foot or pilot operation.

IMPROVED PILOT VALVES Normally used for remote control of air systems. 2 or 3-way types—with or without timer for setting length of time of flow. Used with water or other liquids to eliminate waste such as on spot welders, cooling systems, etc.

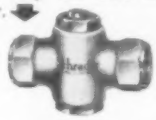
NEW QUICK EXHAUST VALVE Quickly exhausts air from cylinders. Prevents back pressure. Mounts on cylinders.



CHECK VALVES Allow air flow in one direction but check it in the other. Positive tight-sealing.

AIR LINE LUBRICATOR Automatically lubricates air cylinders, chucks clamps, pilot valves or any other air-operated equipment. Wherever there is friction lubrication is necessary.

New SPEED CONTROL VALVES Control speed of air flow in one direction while permitting full flow in other.



Improved AIR LINE STRAINER Small economical device for removing rust, scale, and chips from air line. Easily cleaned.

ROTATING PRESSURE JOINTS Compact, air-tight means of transmitting air pressure from a fixed unit to a rotating unit. Ball bearing construction. Types for partial vacuum or oxygen.

AIR PRESSURE REGULATORS A very simple and effective device for reducing air line pressure. Will reduce line pressure down to zero. Saves wear and tear on tools. Prevents needless waste of high pressure air. Two sizes, either with or without gauges.

Write for complete information today

A gold mine of information for designers—this New 72-Page Catalog of Schrader Industrial Air Control Products. Packed with products, suggestions, and useful data. Write for your personal copy today.

Schrader
PRODUCTS CONTROL THE AIR

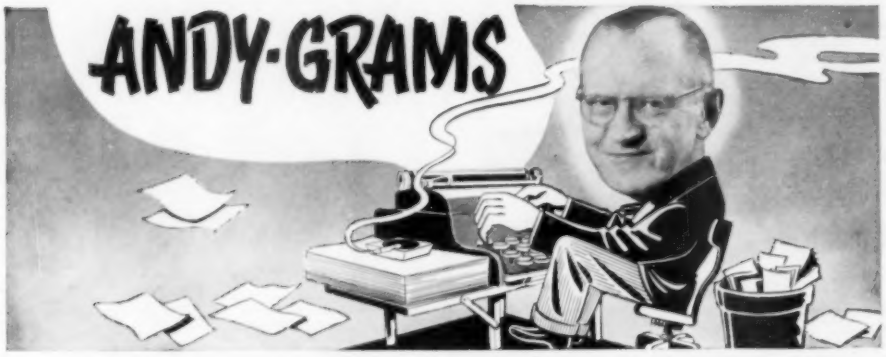
---MAIL THIS COUPON TODAY---

A. SCHRADER'S SON,
498 Vanderbilt Ave.
Brooklyn 17, N.Y.
Division of Scovill Manufacturing Company, Incorporated

Please send me information and free literature about the products I have checked in the squares at the right.

*Name*_____
*Company*_____
*Address*_____
*City*_____ *Zone*_____ *State*_____

Check Here	
☐	Air Cylinders
☐	Operating Valves
☐	Press & Shear Controls
☐	Air Ejection Sets
☐	Blow Guns
☐	Air Line Couplers
☐	Air Hose & Fittings
☐	Hose Reels
☐	Hydraulic Gauges
☐	Pressure Regulators & Oilers
☐	Air Strainers
☐	Uniflare Tube Fittings



Because we had to get May copy to the printers ahead of the Philadelphia meeting, comments about the ASTE Show have had to wait for later issue. But then, the Show is still news, what with the real benefits just starting for the exhibitors, the most of whom were deluged with enquiries. Incidentally, and largely due to the salesmanship of Roland Blu and Tom Barber, the next exposition will be in Chicago in 1952. Better start getting ready!

Arrived at the Philadelphia Auditorium, about the first thing I headed for was Tom Donovan's booth, having had a prior interest in his *angle drive*—or "Rube Goldberg", as he termed it. And thereby hangs a tale. Thirty-odd years ago, while working out a geared angle drive, a young engineer named John Ljungkvist, just over, suggested a design employing pins which, as he stated, had been successfully used in Sweden over a period of years. Made up, it worked fine!

On seeing Tom's gadget, I jokingly accused him of "lifting" it from the Swedes, then, meeting Willis Ehrhardt and Oscar Demuth, sent 'em over along with several others to join in the ribbing. Well, it was all in fun and we couldn't get Tom's goat nohow besides which his booth was a center of interest. By the way, did you get one of his blinking clowns?

Speaking of Swedes—and there were plenty at the Show—I was indirectly responsible for getting Nife, Inc., to exhibit the Jungner grinders which, with the Pullmax shears and the several Swiss exhibits were centers of attraction. Not that I'm plugging their products over the domestic wares; it's just that the foreign exhibitors had a long way to come and we'd like to see more of 'em at the next Show, particularly from Canada and England. After all, we've long since become an international order.

Here, there and everywhere, as I circulated among the exhibits, *auld acquaintance*. If I only had space to mention all! In Ray Murphy—although I couldn't place him at first a/c he'd grown in stature—I met one of my star students from the days of teaching design at the DCAS some fifteen years ago. Ray is now with Sundstrand and, as I get it, forging ahead. Well, I knew the boy would go places. Bill Moreland, now V. C. in Rockford chapter. Predicting his future course in the ASTE, I peg him to go on to ch'man, then delegate, director, veep and maybe prex. By then, he probably won't have much hair.

John Rotchford, Worcester rep for Siewek Tool, introduced Jason Doubleday of Springfield (Mass.) chapter, who wanted to meet me. Don't know why, a/c my *golden fleece* is long since reduced to a fringe. Anyway, the pleasure was mutual. A note from Carl Van Ausdall of Liberty, Ind., but we failed to connect. The time o' day with Warren Ames, celebrating the Ames Golden Anniversary. Bill Rutz and S. L. Little of Giddings & Lewis, with whom I relayed greetings to Fond Du Lac and to Fred Kessenich of Madison chapter. Doug Cooper, erstwhile of Lakeland chapter, who may yet win his past-ch'man's pin from Toronto.

The results of the election, with a few of those unpredictable upsets. Well, they hurt sometimes, although in the long run it may be for the best. As the saying goes: "Uneasy lies the head that wears a crown." Apropos which there comes to mind likeable Ed Dickett who, some years ago, missed the chair by a vote. Yet, Ed took it as one of those things, kept plugging for the Society and has the respect and admiration of the entire ASTE membership.

A zipper greaser from Fred Schmidt of Stuart Oil, then took my turn in line for one of those toy "airmobiles" the Bellows Company was souvineering. (Granddaughter Pam sends thanks!) Friendly John Sylvester and John Savits, with greetings from Boston, and John Geddes who didn't recognize me a/c I've younged (as opposed to aged) a decade or more the past year.

A chat with Bob Barnett of Rochester, a hello with Jim Horne and a wave at Milt Roessel's receding back, Milt being busy. Reminiscences with Atlanta's Charley Jenkins and a handshake with George Brown, who disappeared during a momentary diversion. And I wanted to talk with the guy! John Lapham of Fort Worth, who wears as well as ever and who'll probably be sitting with the top brass one of these days. A nice chap, John—and look, so far I haven't picked a dud.

Breezy Jim Scott, back in harness and rarin' to go. A pleasant meeting with Harry Hultgren of Cushman Chuck, an *incognito* look-see through the Jacobs Chuck exhibit which, like most, was plenty crowded, and a free cigar from Mark Purser of Eastman Kodak. It was OK! Handshakes with Tom Orchard and Art Nichols, both busy. John Cetrule of Triplex, who introduced Luigi Marzoli, prex of Fratelli Marzoli, Italy. An erudite *signor*. Lapointe's Joe Crosby, elected a Director for which congrats to the Delegates. A good man.

Recalling that a J. B. Farwell is prex of Sperry Products and assuming that the J. B. stood for *John Bent*, with whom I worked at the Price-Campbell Cotton Picker Corp. some—well, a few years ago—I left my card with one of the Sperry personnel and just had a nice letter from my erstwhile teammate. A small world, eh, John?

At the banquet—one of the best, to my mind—Bob Douglas relinquished his gavel in a blaze of glory. Based on his brilliant career in the ASTE, it shouldn't be long ere the Canadians start calling him *Your Worship*. (Canadian papers please copy.) Missed several of the exhibitors who, it turned out, had to take to the sheets a/c the ordeal of the Show. Anton Peck from the Coast; a skoal with Clarence Etter and a toast to Mrs. John Johnston of Maine, to whom I had the pleasure of being introduced by her boy friend John. A gala event all through, with the *protocol* a bit more formal than usual.

Going home, cancelled my RR reservation and rode with Bert Carpenter. A real pleasure trip taking in the west bank of the Hudson, *smörgasbord* at the Palisades, dinner at one of the famous *Skaneateles* inns—and Bert, what was that joke about the stewed tomato? I didn't get it. Next AM, a couple of hours at Niagara Falls, then home via Canada. Spelling Bert at driving, I got used to his automatic transmission and, next morning, wondered why my crate wouldn't move when I stepped on the gas. I finally remembered the clutch.

Back on the job, saw a nice letter from Prex Tigges to Harry Conrad on the bulletin board, complimenting Harry and the HQ staff on their fine work in connection with the Show. Well, they had it coming, everybody having worked hard both before and during the exposition. And plenty of credit goes to Joe Friel and to Athel Denham, the latter having worked himself into bed. Up and at 'em, Athel!

For that matter, everybody connected with the Show—officers and committee workers, Philadelphia chapter, exhibitors and their personnel—can take a bow for their share in making the Show the success that it was. And as previously intimated, the end is not yet, the exhibitors still having to take care of enquiries and orders. And that's all for now a/c being down to the final•

ASTEely yours

Andy

P. S. Just as copy was going to the printers, heard that Joe Friel is having his gall bladder out. (Joe, you'll never miss it, and what I said to Athel Denham goes for you too. Up and at 'em!)

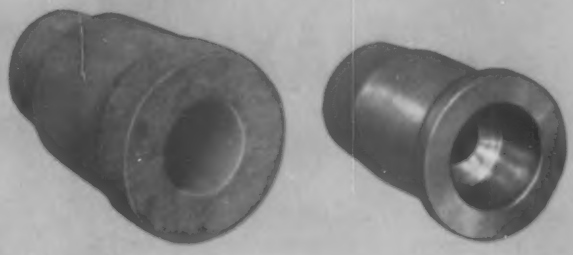
Combining cuts . . .

—A PAY-OFF FEATURE CHARACTERISTIC of ALL POTTER & JOHNSTON AUTOMATICS

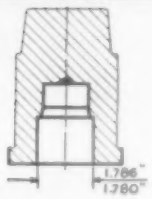
And P&J's tool engineering service makes the most of it — by eliminating unnecessary work handling and reducing machining times to an absolute minimum. Mass-producing any precision work of this class on obsolete equipment, or on machines less versatile or flexible, costs you money.

But it costs you nothing to figure it out for yourself, on your own work. Simply send a sample part or prints to Pawtucket for a P&J recommendation and estimate — then compare.

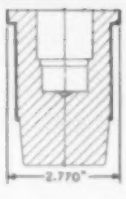
For Example: THESE ANNEALED CAST IRON THIMBLES



ARE MACHINED WITH MAXIMUM PRODUCTIVITY AND PROFIT ON THE P&J 5-D2-9 (2 SPINDLE) AUTOMATIC . . . ONE FINISHED PIECE PER TURRET CYCLE. HEAVY LINES IN DRAWINGS INDICATE SURFACES MACHINED. OPERATIONS DETAILS, TURRET FACE BY TURRET FACE, SHOW HOW CUTS ARE COMBINED TO SAVE TIME AND EARN PROFITS.

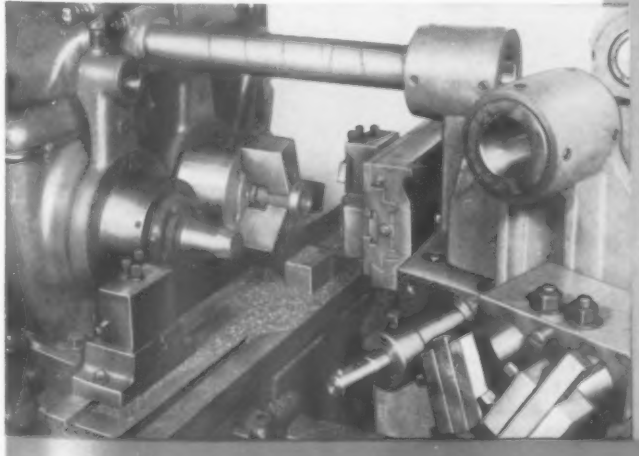


First Operation on REAR SPINDLE



Second Operation on FRONT SPINDLE

1st T.F.	Drill Hole	Rough Turn Taper
2nd T.F.	Rough Bore and Face 2 Dias. — Machine Bevel. — Rough Face Flange. — Turn Flange O.D.	Turn Flange Dia. Turn Body Dia. — Face Shoulder
3rd T.F.	Bore 2 Dias.	Finish Turn Body Dia. — Face Shoulder. Finish Flange O.D.
4th T.F.	Finish Face Shoulder	Finish Face Flange. — Face Bottom of Bores with Slide Tool
5th T.F.	Ream 2 Dias.	Size Turn Body Dia.



P&J 50 YEARS' EXPERIENCE IN TOOLING FOR
Precision + Productivity + Economy

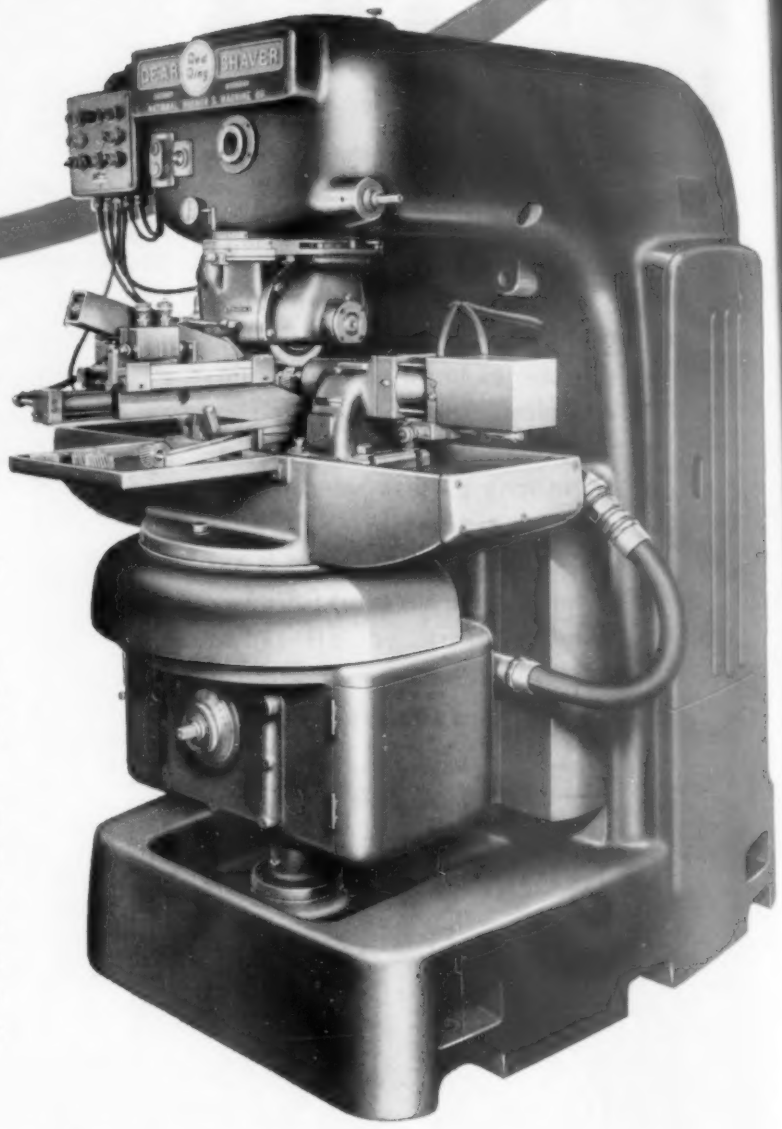
POTTER & JOHNSTON CO.
PAWTUCKET, R. I.
subsidiary of PRATT & WHITNEY
Division Niles-Bement-Pond Company

P&J

AUTOMATIC LOADING permits you to turn out

Precision Gears with unskilled operators

at MAXIMUM PRODUCTION RATES



You as a gear manufacturer under present industrial and market conditions can correctly evaluate production equipment that:

❶ Assures extremely close gear tolerances consistently.

❷ Does not require any mechanical skill to operate.

❸ Eliminates operator fatigue and its effect on morale.

❹ Operates continuously at mass production speed.

That is precisely what you can have with Red Ring Automatic Loading in connection with Gear Shaving Machines GCU or GCV.

Either of these machines so equipped can be run continuously merely by keeping a supply of work gears in the magazine and removing the finished gears. One operator easily serves a battery of machines, for the entire machining operation is entirely automatic.

SPUR AND HELICAL
GEAR SPECIALISTS
ORIGINATORS OF ROTARY SHAVING
AND ELLIPTOID TOOTH FORM

Production rates are phenomenal.
Write for descriptive literature.

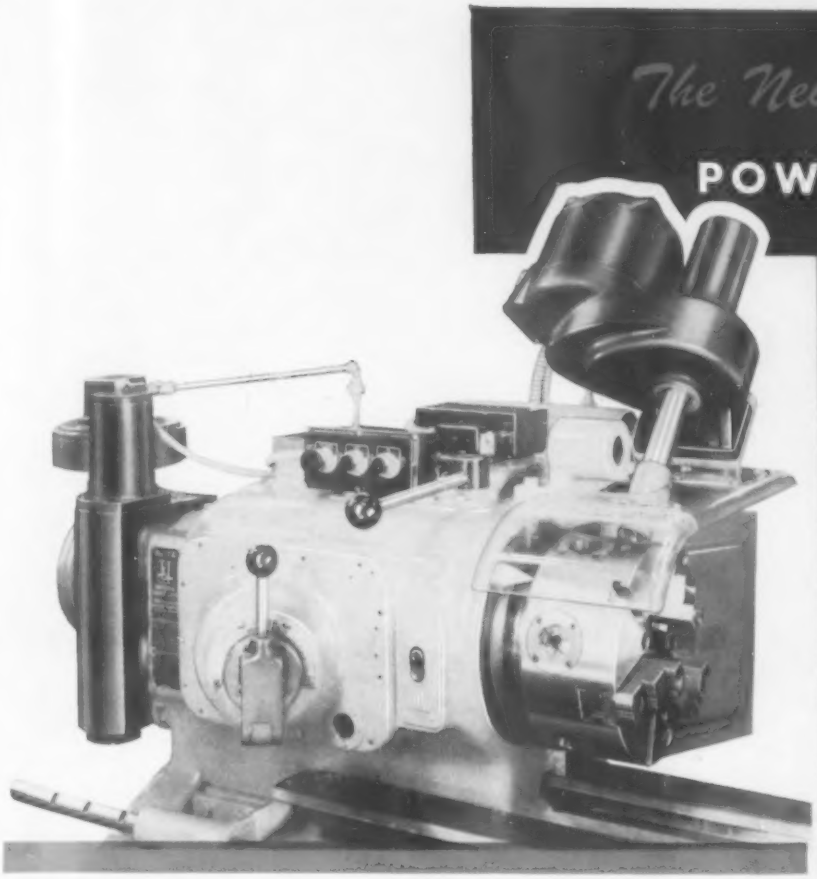
NATIONAL BROACH AND MACHINE CO.

5600 ST. JEAN . . . . . DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-115

Practical aid to EFFECTIVE cost REDUCTION



The New CUSHMAN POWER WRENCH

9 Key Features

- Automatic Indexing of Spindle to Chuck Loading Station
- Full Interlock between Spindle Control Lever and Wrench Shaft
- Push Button Control for Operation of Wrench
- Absolute Safety
- Time and Effort Saving
- Controlled Torque for Correct Jaw Pressure
- Chucks Designed for Bar and Chuck Work
- Clear Hole thru Spindle and Chuck
- Adaptable to all Single Spindle Tools

INTRODUCED AT THE ASTE INDUSTRIAL EXPOSITION

This entirely new model of the Cushman Power Wrench, adaptable to use either with standard Wrench operated chucks or with the specially developed new Cushman multiple lug chucks, marks another important step forward in speed and operating efficiency of single spindle machines.

It is hardly necessary to emphasize the tremendous saving in physical effort in comparison with manual wrenching on repetitive operations. Time savings are equally impressive. Automatic indexing and full interlock mean complete safety for machine and operator. Controlled torque protects work, assures positive grip. Clear hole through spindle makes this method the first practical way to enjoy power chucking economies on bar work.

The equipment is adaptable to all single spindle machines . . . an aid to cost reduction many shops can install now. Let us send you at once full engineering details and recommendations for your specific applications.

CUSHMAN

WRITE FOR

WRENCH OPERATED CHUCKS CATALOG NO. 64
POWER OPERATED CHUCKS CATALOG NO. PO-64

THE CUSHMAN CHUCK COMPANY
HARTFORD 2, CONN.

Announcing
NEW WALES TYPE "G" UNITS
FOR PUNCHING HOLES IN 1/2" THICK MILD STEEL

Piercing 1/2" thick mild steel is a powerful job. Wales engineers have developed an exclusive independent, self-contained unit that will do it. The unique "Split Punch" eliminates the tremendous stripping pressures and oversize stripping springs that have always been associated with punching thick material. All the stripping spring has to do in the new Wales Type "G" Hole Punching Units is to lift the punch to the "up" position after it has pierced the material. Yes, do it simply and do it better.

Like all other standard Wales Hole Punching Equipment, these units may be rapidly mounted on templates and T-slotted plates in press brakes and stamping presses.

Write TODAY for fully-illustrated Bulletin G.

WALES-STRIPPIT CORPORATION

George F. Wales, Chairman

393 PAYNE AVENUE, NORTH TONAWANDA, N. Y.

(Between Buffalo and Niagara Falls)

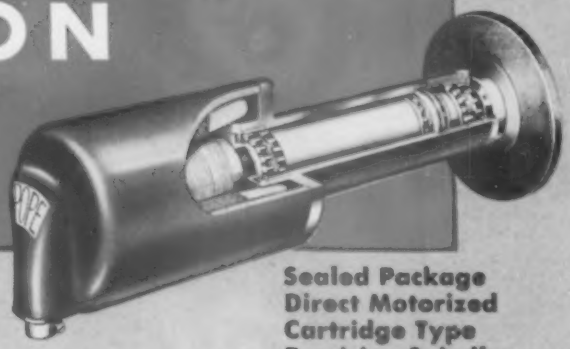
Wales-Strippit of Canada Ltd., Hamilton, Ontario

Specialists in Punching and Notching Equipment

Showing a set-up of Wales Type "G" Hole Punching Units in a press brake. Note the holes punched in the strip of 1/2" thick mild steel.

Showing a stamping press set-up with a 1/2" thick punched gusset in the foreground and the Type "G" Units in background.

Specify POPE PRECISION SPINDLES



Sealed Package
Direct Motorized
Cartridge Type
Precision Spindles

Here's Why:

1. **POPE Spindles produce finer finishes.** They have the necessary massive construction and the radial and axial rigidity — *two* double-row, *super-precision*, cylindrical roller bearings and *two* separate ball thrust bearings.

2. **POPE Spindles increase production.** They have the power, the bearing capacity and the rigidity to carry a heavy cut. Rapid metal removal combined with superior final finish saves much operating time.

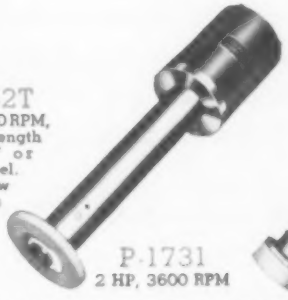
3. **POPE Spindles come in sizes to fit YOUR job.** They come in ½, 1, 2, 3, 5, 7½ and 10 HP and in 3600, 1800 or 1200 RPM to suit the work or the tool.

4. **POPE System of sealed-in lubrication** permits operation horizontally, vertically or at any angle — on boring mills, planers, millers, and other machine tools as well as on surface grinders.

5. **POPE Spindles require no maintenance costs** for lubrication or adjustments. This is just another bonus you get by specifying POPE Spindles.

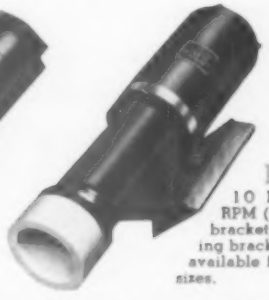
P-34
½ HP, 3600 RPM

P-32T
1 HP, 3600 RPM, over-all length 25½", 3" or 3½" dia. barrel. Cut-away view (above) shows the permanently preloaded, permanently lubricated bearings.



P-1731
2 HP, 3600 RPM

P-771
5 HP, 3600 RPM



P-772
10 HP, 3600 RPM (Shown in bracket). Mounting brackets are available for all sizes.

When you want a Precision Spindle let us have your specifications and you'll receive a prompt reply including price and delivery. Ask for Data Sheet No. 12

No. 70

POPE

TRADE MARK REG. U.S. PAT. OFF.

POPE MACHINERY CORPORATION

ESTABLISHED 1920

261 RIVER STREET • HAVERHILL, MASSACHUSETTS

BUILDERS OF PRECISION SPINDLES

DO YOU REQUIRE REAL ACCURACY AT LOW COST?

A **BULLARD SPACER** applied to Radial Drills has proved its worth in Savings by eliminating many costly jigs previously required on many drilling operations.

Almost unbelievable operational Savings have also been made.

However, Accuracy is only as good as the accuracy of the Drill to which the Spacer is applied. To assure the Accuracy of which the spacer is capable, Cincinnati Bickford offer their Super Service Precision Drilling Machine.

With a Precision Spindle in the drill, this combination is *Hard to beat* on reproduced Accuracy of hole spacing, drilling, reaming and tapping.

Installations of this type are proving Profitable investments in numerous plants. Ask Bullard or Cincinnati Bickford about this "Natural" combination.

THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT

COATED PRODUCTS COMMENTS

How much is the right answer worth?

In terms of unit cost, increased production or improved product quality — more importance is being attached to the correct selection and application of coated abrasives than ever before. The reason is readily found in hard dollar and cent figures that spell out time and money saved by a re-appraisal of the abrasive used for a particular job or in a different means of application. In any number of cases, the correct answer has been worth plenty.

As technical advances are made in materials and machines and as new abrasive tools are developed or new ways of gaining increased efficiency are realized... examination of your grinding and finishing operations becomes even more important.

This is where CARBORUNDUM's specialized experience can be of value to you... in working toward better utilization of the best coated abrasives for your requirements. Coated Products Division, The Carborundum Company, Niagara Falls, New York.

COATED ABRASIVES BY

CARBORUNDUM

TRADE MARK

Making ALL abrasive products...
to give you the proper ONE

"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company

Swartz Std. L Type Head on Special Fixture

Represented By:

CLEVELAND
Production Tool Co.

MILWAUKEE
Geo. M. Wolff Co.

HOUSTON
Engineering Sales Co.

CHICAGO
Ernie Johnson

PITTSBURGH
Tool Engineer Products

PHILADELPHIA
Morgan Tool Equipment Co.

LOS ANGELES
Technical Broaching Co.

NEW ORLEANS
Engineering Sales Co.

CINCINATTI
R. W. Pratt

BOSTON
A. R. Shevlin & Co.

TOLEDO
Peerless Tool Service Co.

CANADA
Firth Brown Tools, Ltd.
Galt, Ont.

Reduce Clamping Time
Of Odd Shape Parts

Rapid Clamping Can Be
Applied To Any Part

One Wrench Often Replaces
Four Slow Operating Clamps

WRITE FOR
CATALOG 941

In drilling flange hole of this exhaust manifold a special base was provided on account of its height. However, a Swartz L type fixture is plainly recognized.

SWARTZ TOOL PRODUCTS CO., INC.

13330 Foley Ave. Tel. WE 3-1522 Detroit, Michigan

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-102-1

COST CUTTER!

Saw NON-FERROUS METALS

WITH THE MOTCH & MERRYWEATHER

Carbide Tipped BLADE

Solid—up to 36" dia.
Segmental—11" to 36" dia.
Prices quoted upon request.

More cuts and more accurate cuts between regrinds add up to a lower cost per cut. Fewer regrinds also mean more usable, profitable operation. Clean, square ends minimize finishing expense. One M. & M. carbide-tipped blade has been known to outlast over 100 ordinary blades. Please define your requirements and expect a convincing recommendation.

Write for bulletin 230-T.

THE MOTCH & MERRYWEATHER MACHINERY CO.
PENTON BUILDING · CLEVELAND 13, OHIO

AT YOUR COMMAND · AN UNPARALLELED EXPERIENCE IN CIRCULAR SAWING

USE READER SERVICE CARD; INDICATE A-6-102-2

HAVE YOU PURCHASED YOUR TOOL ENGINEERS HANDBOOK?

Over 15,000 men are now using the ASTE Handbook

PRICE
Members $11.00
Non-members . 15.00

ORDER YOURS NOW!

Remittance payable to Society must accompany order.

Mail to Dept. 3

AMERICAN SOCIETY OF TOOL ENGINEERS

10700 Puritan Avenue Detroit 21, Mich.

USE READER SERVICE CARD; INDICATE A-6-102-3

SAY, RED,
THIS IS A GOOD PLACE TO WORK. I HAVEN'T HAD A SHUT DOWN BECAUSE OF TOOL FAILURE FOR WEEKS.
RED SHIELD: SURE – THIS SHOP STANDARDIZES ON SHIELD BRAND CUTTING TOOLS. THAT'S WHY WE HAVE SO LITTLE PRODUCTION INTERRUPTION. THAT HELPS OUR PRODUCTION BONUS, TOO. IT SURE IS A GOOD PLACE TO WORK.

Tool Quality that gives uninterrupted production

IF interrupted production because of tool failure is taking a nick at your profits—try Standard Shield Brand Tools.

They are Foremost Quality in design—workmanship—material. Qualities that in themselves give you assurance of continuous performance.

Then, too, our service staff is trained and experienced—more than 69 years of accumulated knowledge of cutting tools is available to you through these Standard Men.

Standardize—and save. Call your Industrial Supply Distributor for prompt delivery of Standard Shield Brand Tools.

STANDARD TOOL CO. CLEVELAND 4, OHIO

New York • Detroit • Chicago • San Francisco

THE STANDARD LINE: *Drills • Reamers • Taps • Dies • Milling Cutters • End Mills • Hobs • Counterbores • Special Tools*

PRECISION MACHINES pm PARKER • MAJESTIC

Since 1907, the name of Parker has been a part of the progress of the automobile industry.

In 1915, Parker introduced the basic principle of ball bearings in grinding manufacture—a major advance in grinding which was unknown at that time.

A few years later the Parker Ball Bearing was patented to meet high speed and precision requirements and has been in use ever since.

Further research and engineering development brought forth the well-known Parker Majestic External and Internal Grinding Machines, each machine representing a great advance in simplicity of operation and precision.

The latest tooling development of the company is the Parker Majestic No. 2 Surface Grinder that provides new accuracy and flexibility for small grinding operations.

These many products of Parker Majestic will continue to serve the great automotive industry in the future, keeping pace with its demands for speed, accuracy and dependability.

MANUFACTURED BY

MAJESTIC TOOL AND MANUFACTURING COMPANY

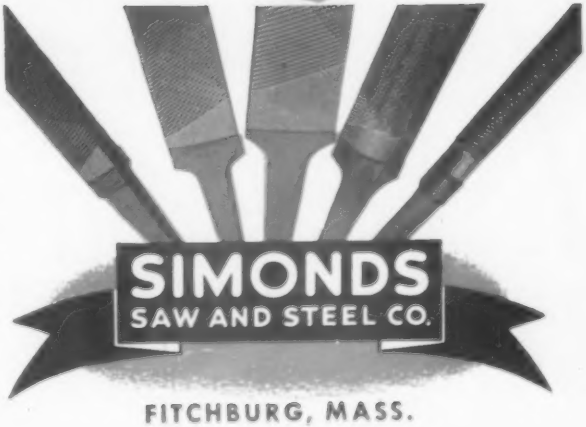
147 JOS CAMPAU • DETROIT 7, MICHIGAN

Distinctively Designed...Easier Recognized ...Shows First Quality at First Glance

Simonds "Red Tangs"... *the files that cut instead of scrape,* because they have teeth like a Simonds metal-cutting saw... will soon come to you in these distinctive ALL-RED packages.

This modern dress is designed for "family resemblance" to other Simonds red-trademarked, red-packaged products ... and for easier identification of the files that are made in first-quality only ... the files that workers like because they cut faster with less "elbow-grease."

So watch for these new ALL-RED packages...and make it a point to specify Simonds "Red Tang" on your next file order.



FITCHBURG, MASS.

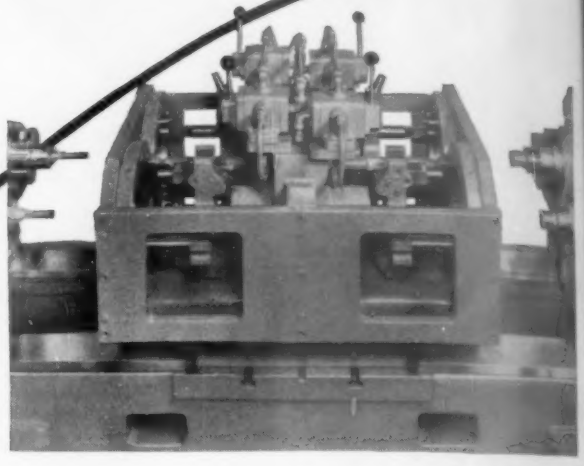
Branch Offices in Boston, Chicago, Los Angeles, San Francisco and Portland, Ore., Vancouver, B. C. Canadian Factory in Montreal, Que.

SIMPLEX

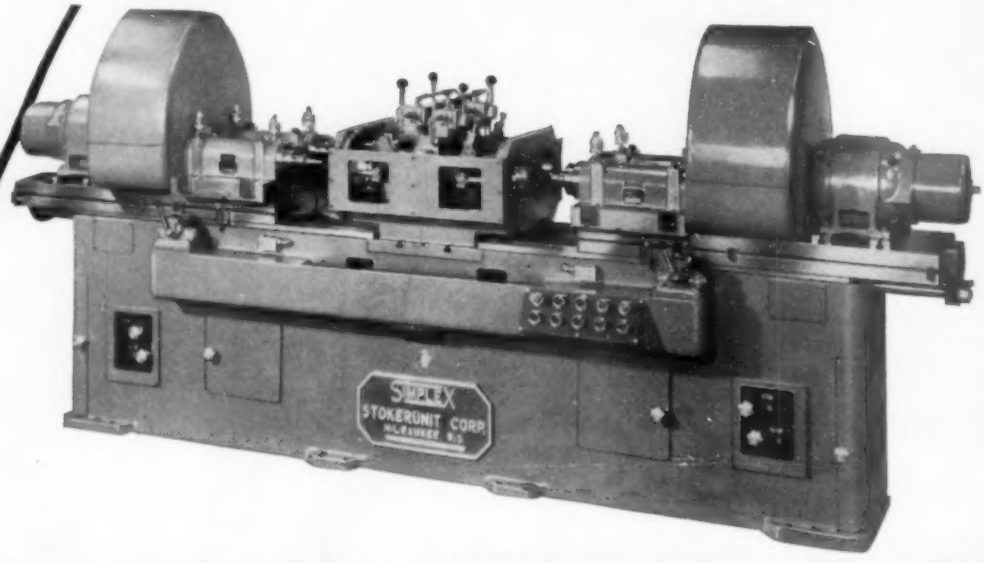
Accuracy!

Finish!

Minimum Set Up Time!



The finish precision boring of the bearings in production lots of various sizes of end shields for a large electrical motor manufacturer demanded a machine and tooling that would deliver maximum accuracy and finish and could be changed over with a minimum down time. A SIMPLEX #2U 2-Way Precision Boring Machine equipped with four #2 SIMPLEX Precision Boring Heads and a multiple part work-holding fixture met this demand. The accompanying pictures show the machine and also the tooling furnished. The work-holding fixture featured hydraulic actuation of the clamp bars assuring positive clamping and ejection of the work part with minimum effort of the operator.



PRECISION BORING MACHINES

SIMPLEX MACHINE TOOLS DIVISION

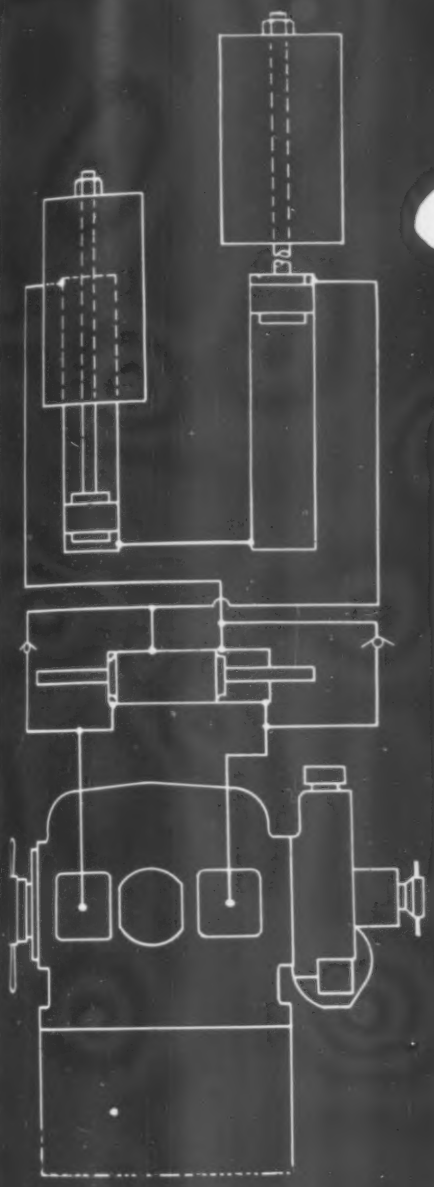
STOKERUNIT CORPORATION

4528 West Mitchell Street

MILWAUKEE, WISCONSIN

Precision Boring Machines, Planer Type Milling Machines, Special Machine Tools

SPECIAL features are *Standard*



Oilgear Two-Way Electro-Hydraulic Controlled Variable Delivery Pump.
Interlock Cylinder for Operating Shuttle Tables.
Left Hand Tool Slide Cylinder.
Right Hand Tool Slide Cylinder.

Oilgear Broaching Machines employ Oilgear Fluid Power Systems. These Systems provide as *standard* equipment: (1) important, exclusive, patented features that other systems do not offer; and (2) additional features available only at extra cost in other machines.

Important Features of Oilgear Broaching Machine Fluid Power Systems are:

1. Oilgear two-way reverse flow variable delivery pumps which provide higher cutting speeds as *STANDARD*.

2. Two-way reverse flow variable delivery pumps which enable you to independently adjust cutting and return speeds to the maximum permissible requirements of the job . . . and to the ability of the operator to serve the machine.

3. Exclusive patented electro-hydraulic two-way directional pump control which eliminates the usual conglomeration of separate valves and piping . . . and condenses all controls into a simple unit integral with the pump.

4. Positive broaching speed under load up to 150% overload.

5. *Savings* in power because Oilgear *uses* power only in proportion to the speed and force required . . . because its regenerative circuits reclaim power on every return stroke . . . and because it employs *NO* speed, directional or other valves t waste power.

6. Simple systems which use less pipin require less space, employ smaller motor operate efficiently with smaller fluid rese voirs, require less oil, promote goo housekeeping.

7 Compact machine construction with a parts easily accessible for adjustme and servicing.

Oilgear Broaching Machines always hav been and are today the most highly produ tive line of broaching machines. There an Oilgear Machine for every broachi need and if you are not familiar with th entire line you are invited to send f bulletins. THE OILGEAR COMPAN

1573 W. Pierce St., Milwaukee 4, Wisco sin.

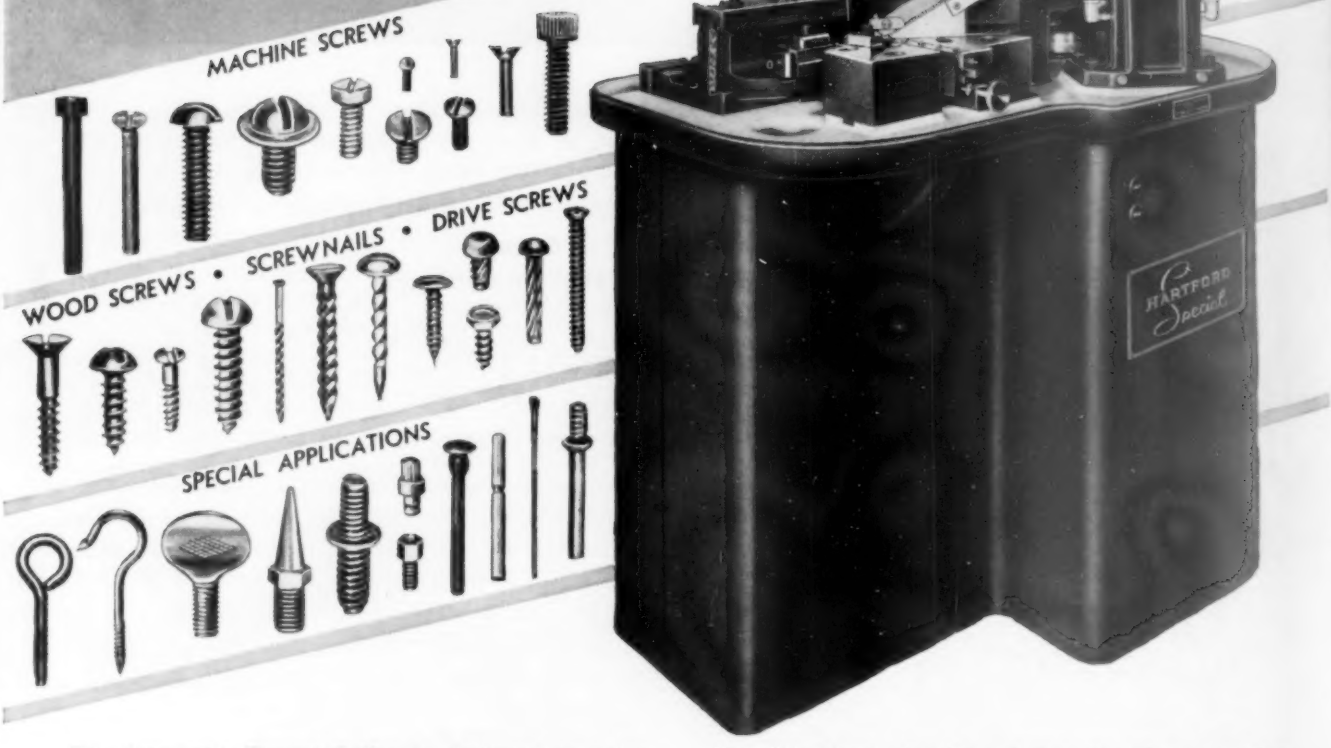
Oilgear

Fluid Power

LOW COST — HIGH PRODUCTION

HARTFORD Special

Automatic Thread Roller



This Automatic Thread Roller is designed to solve standard and special thread rolling problems on small size screws from .086" to .190" in diameter with thread length capacity from ⅛" to 1½", rolling consistently to Class 3 Thread Fit. Careful engineering and rugged construction make it capable of continued high production runs with startling economy.

The "Hartford Special" Automatic Thread Roller incorporates such outstanding features as Completely Automatic Feed, Filtered Lubrication System, "Table Top" Working Level, Vibration-Free Operation, plus many more.

Our engineering staff is always available to help you work out your thread rolling problems. Write now for complete information.

HARTFORD Special

Automatic Drilling and Tapping Machinery • Swaging Machines
Die Polishing Machines • Contract Machine Work • Gears • Cams
"Super-Spacers" • "Four-Point" Milling Vises • "V-Block" Milling Fixtures

THE HARTFORD SPECIAL MACHINERY CO.
287 Homestead Ave., Hartford 5, Conn.

Please send me free Bulletin TR-100 describing your Automatic Thread Roller.

Name _____ Pos. _____

Company _____

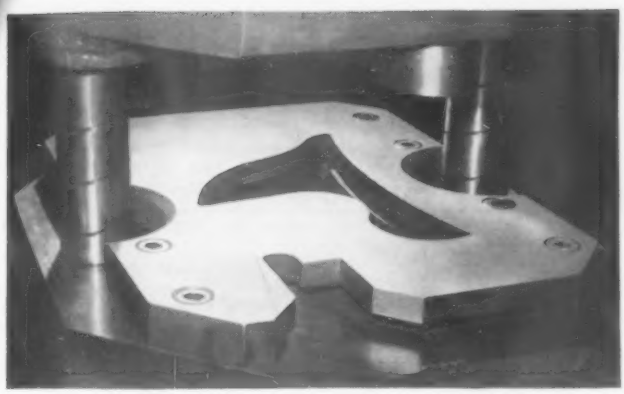
Address _____

7 City _____ Zone _____ State _____

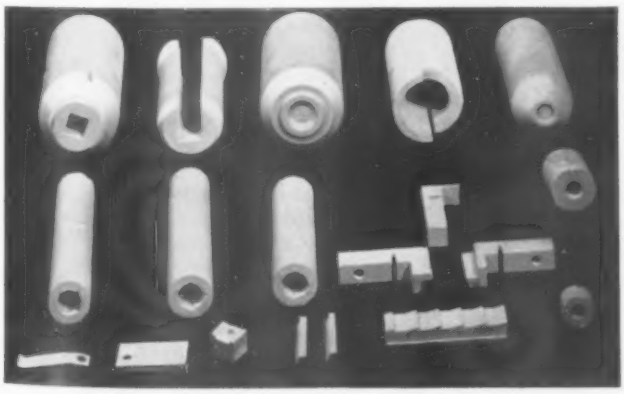
BETHLEHEM STEEL

MANUFACTURING PLANTS · MACHINE SHOPS
SHIPYARDS · FORGE SHOPS · ROLLING MILLS
MINES · FOUNDRIES · FABRICATING WORKS

This tool steel proving ground means better tool performance



This blanking die is made from Lehigh H, our popular high-carbon, high-chrome steel for long production runs. Made in one of our own tool-rooms, this die produces parts from 3/16-in. steel plate for our weldment shop at the Bethlehem, Pa., plant.



These automatic bolt-header parts are typical of the many uses at our Lebanon, Pa., plant for our carbon tool steel (cold-heading quality) and Bethlehem hot-work and shock-resisting steels.

We are makers of tool steel, and large users as well. We use hundreds of tons of Bethlehem Tool Steels every year. Tools and dies, made from dozens of our different grades, are put to work on production jobs in Bethlehem shipyards, mines, machine shops, foundries, forge shops, rolling mills, fabricating works and manufacturing plants.

Knowing exactly how to treat and apply a tool is often just as important as the inherent quality of the tool steel. By making full use of our tremendous proving grounds we've learned a whale of a lot about tool steel. On one job, for example, we may match three grades against each other. In another case we may try several different heat-treatments on one steel in order to achieve the best properties for a shear blade, a tool bit, or a punch. Improved grades of tool steel are often the direct result of long observance of tool performance in our own shops.

By putting tool steels to work among our own family, we gather reliable facts with which to supplement the findings of our laboratories. All of this leads to finding better ways to heat-treat tools, improved techniques in forging, machining, grinding. We pass along this information to users of Bethlehem tool steel—just one of many benefits that result. It's a continuous development program—unmatched in its scope!

Bethlehem makes all tool steels. In our modern mill depot we stock 23 grades of standard and special-purpose steels for quick delivery to our distributors and mill customers.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation.

Bethlehem ULTRASONIC TESTED **Tool Steel**

Acme Offers
Complete Facilities for

PRECISION GRINDING

FAST SERVICE... LOW COST

- INTERNAL
- EXTERNAL
- CRUSH FORM
- CENTERLESS
- TWIN DISC
- SURFACE
- THREAD

Acme is equipped to handle all types of precision grinding. Expert craftsmen, using newest methods and modern equipment, will do the job for you faster, better, more economically. Acme also offers a flat lapping service that can finish surfaces to within millionths. Write for details.

Acme Industrial Company

Makers of Standardized Jig & Fixture Bushings

208 N. LAFLIN STREET • CHICAGO 7, ILLINOIS

THE SERVICE SHOP TO INDUSTRY FOR MORE THAN 25 YEARS

USE READER SERVICE CARD; INDICATE A-6-110-1

Fellows

MACHINES and TOOLS FOR CUTTING . . . SHAVING . . . BURNISHING AND INSPECTION in GEAR PRODUCTION

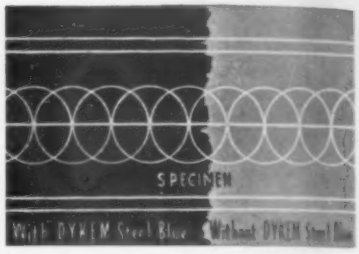
THE FELLOWS GEAR SHAPER COMPANY, SPRINGFIELD, VERMONT

USE READER SERVICE CARD; INDICATE A-6-110-2

DYKEM STEEL BLUE

STOPS LOSSES

making dies & templates



Simply brush on right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief and at the same time prevents metal glare. Increases efficiency and accuracy.

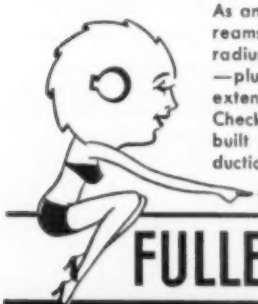
Write for full information

THE DYKEM COMPANY, 2303D North 11th St., St. Louis 6, Mo.
In Canada: 2466 Dundas St. West, Toronto, Ont.

USE READER SERVICE CARD; INDICATE A-6-110-3

Machine MULTIPLE DIAMETERS- in ONE OPERATION with SUBLAND TOOLS and Cut Production Costs

As an example: the tool pictured at left, above, reams and counterbores a 1.375 hole, forms a radius and reams a 1.750 hole *all in one operation* —plus the economy of easy resharpening and extended tool life available with subland design. Check and see if a subland tool, designed and built under Fuller supervision, will not cut production costs for you.



"BETTER" if it's made by FULLER!

SKILLED CRAFTSMEN

FULLER TOOL Co.

SPECIAL TOOLS • PRECISION MACHINING

GUILD

3956 WEST ELEVEN MILE ROAD
BERKLEY • MICHIGAN
Telephone LINCOLN 2-5600

USE READER SERVICE CARD; INDICATE A-6-110-4

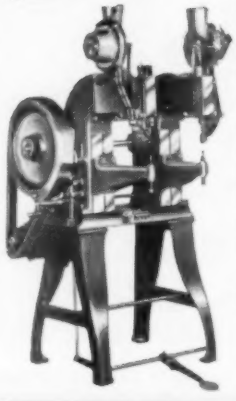
WHATEVER YOU FASTEN . . .

COMPOSITION TO COMPOSITION · FABRIC TO FABRIC · WOOD TO WOOD · METAL TO METAL · LEATHER TO LEATHER

OR ANY COMBINATION OF THESE MATERIALS . . .

Chicago AUTOMATIC RIVETING

FASTENS IT RIGHT . . . AND FASTENS IT FAST



• In Chicago Automatic Rivet Setters from 1 to 4 tubular or split rivets are fed, inserted and clinched in a fraction of a second with each operating pedal release. Adjustment on some models permits handling different sizes of rivets. Riveting machine also adaptable for eyelets, grommets or drive screws.

***FREE* Fastening Analysis**

Your output may be increased and cost reduced if you investigate. Send sample assembly and blue print.

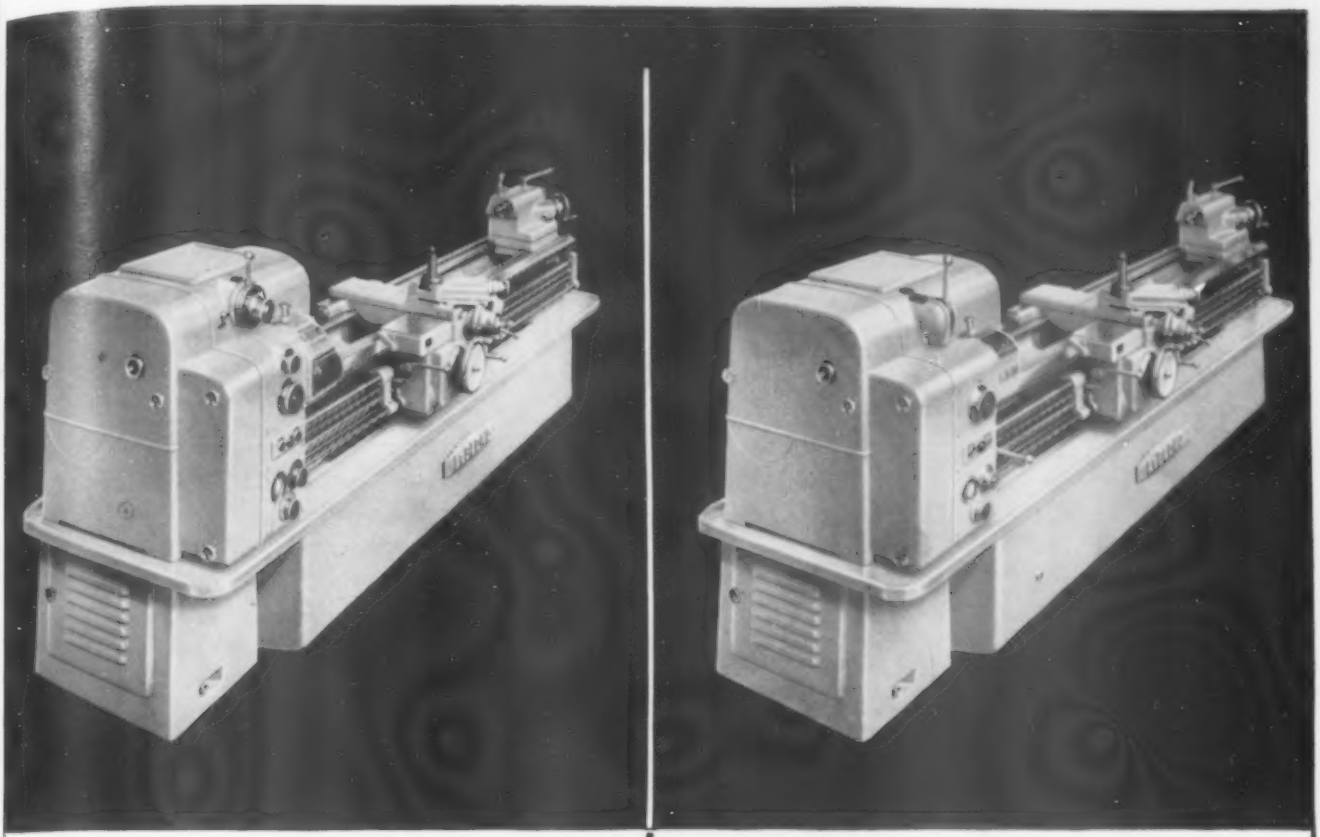
Chicago Rivet

CHICAGO RIVET & MACHINE CO.

9619 W. Jackson Blvd., Bellwood, Ill. (CHICAGO SUBURB)

Tubular and Split Rivets In All Rivet Metals

USE HEADER SERVICE CARD; INDICATE A-6-110-5

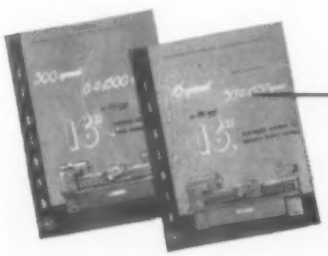


which is the better lathe for you?

16" LeBlond Model RT
Tool Room Lathe with over 300
spindle speeds 6 to 1500 rpm
obtained through variable speed drive.

16" LeBlond Model RT
Heavy Duty Engine Lathe
with 16 spindle speeds
30 to 1537 rpm or 20 to 1025 rpm.

The RT's represent an entirely new approach to engine and tool room lathe construction and operation. Utilizing the combination gear-belt drive headstock, they deliver speeds as low as 6 rpm and as high as 1537 rpm, can therefore perform a broader scope of work. Both are built with 4-directional power rapid traverse, enclosed quick change box, one-piece apron (combined feed apron optional), hardened and ground steel bed ways, thrust-lock tailstock with spindle travel dial, and many other modern lathe advantages.



for complete information

see our catalog in Sweet's File for the Mechanical Industries, or send for bulletins RT-31 and HD-30-A.

THE R. K. LeBLOND MACHINE TOOL CO., CINCINNATI 8, OHIO, U.S.A.
LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES
SALES OFFICES: New York, Chicago, Detroit.

LeBLOND

"no more GAMBLING on tool steel selection"

[⅓ actual size; Selector is in 3 colors]

Since the first announcement, hundreds of tool steel users have received their CRUCIBLE TOOL STEEL SELECTORS. The comments received indicate that this handy method of *picking the right tool steel right from the start* is going over big.

"Handiest selector I've ever seen"

"No more gambling on tool steel selection"

"You're right, the application should dictate the choice of the tool steel" . . . and many, many more favorable comments.

You'll want your CRUCIBLE TOOL STEEL SELECTOR. It uses the only logical method of tool steel selection—begin with the application to pick the right steel! And the answer you get with one turn of the Selector dial will prove satisfactory in every case, for the CRUCIBLE TOOL STEEL SELECTOR covers 22 tool steels which fit 98% of all Tool Steel applications. ALL the tool steels on the Selector are in Warehouse Stock . . . that means when you get the answer, you can get the steel . . . fast!

Write for your Selector today! We want you to have it, because we know you've never seen anything that approaches your tool steel problems so simply and logically. Just fill out the coupon and mail. Act now! CRUCIBLE STEEL COMPANY OF AMERICA, Chrysler Building, New York 17, N. Y.

Here's how it works:

To use the Selector, all you need know is the characteristics that come with the job: type and condition of material to be worked, the number of pieces to be produced, the method of working, and the condition of the equipment to be used.

FOUR STEPS—and you've got the right answer!

1. Move arrow to major class covering application
2. Select sub-group which best fits application
3. Note major tool characteristics (under arrow) and other characteristics in cut-outs for each grade in sub-group
4. Select tool steel indicated

That's all there is to it!

Here's an example:

Application—Deep drawing die for steel

Major Class—Metal Forming—Cold

Sub-Group—Special Purpose

Tool Characteristics—Wear Resistance

Tool Steel—Airdi 150

One turn of the dial does it!

And you're sure you're right!!

Crucible Steel Company of America
Dept. T, Chrysler Building
New York 17, N. Y.

Gentlemen:

Sure! I want my CRUCIBLE TOOL STEEL SELECTOR!

Name_____ Title_____

Company_____

Street_____

City_____ State_____

CRUCIBLE first name in special purpose steels

TOOL STEELS

fifty years of Fine *steelmaking*

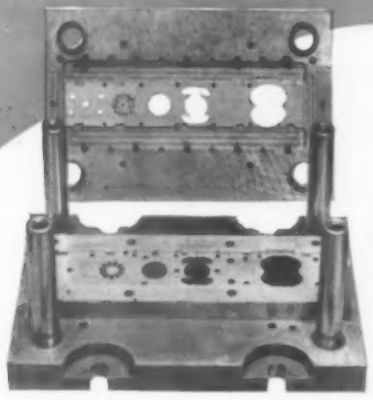
Branch Offices and Warehouses: ATLANTA • BALTIMORE • BOSTON • BUFFALO • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DENVER • DETROIT HOUSTON, TEXAS • INDIANAPOLIS • LOS ANGELES • MILWAUKEE • NEWARK • NEW HAVEN • NEW YORK • PHILADELPHIA • PITTSBURGH • PROVIDENCE ROCKFORD • SAN FRANCISCO • SEATTLE • SPRINGFIELD, MASS. • ST. LOUIS • SYRACUSE • TORONTO, ONT. • WASHINGTON, D. C.

160 pieces a minute to tolerances of less than .0005"!

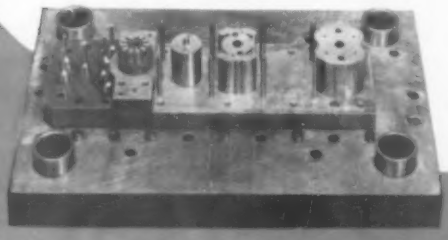
These rotor and stator elements are stamped in the six station die shown below in a 50-ton press at 80 strokes per minute. With half thousandth piece part tolerances, almost perfect die alignment is a must! That's why . . .

they built the die in a

DANLY PRECISION DIE SET



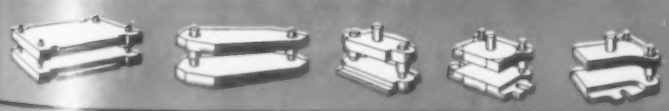
Die built by the Sherman Tool & Die Co., Charlestown, Massachusetts, for the Signal Manufacturing Co., Lynn, Massachusetts, in a Special Danly Precision Die Set!



Danly precision makes every Danly Die Set a reliable base for the finest die work. They save time in the die shop because they are square and true . . . they assure longer production runs in the press because precision closure protects die components.

Standard Danly Die Sets are quickly available from a nationwide system of completely stocked assembly branches. Just phone for fast delivery, and for the finest in die set precision, always specify Danly.

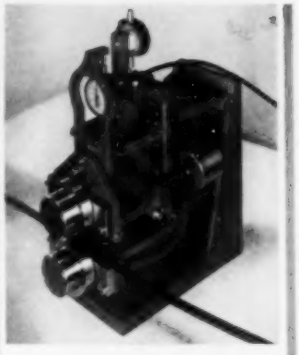
DANLY MACHINE SPECIALTIES, INC.
2100 South 52nd Avenue Chicago 50, Illinois



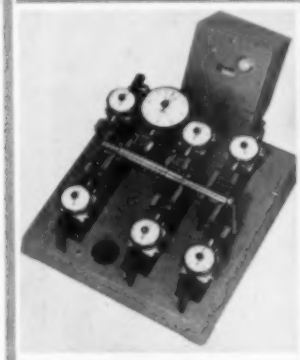
DANLY®

PRECISION DIE SETS . . . STANDARD AND SPECIAL

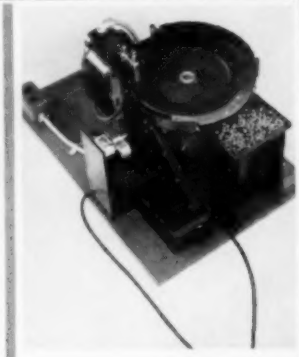
Machine Size Control



Continuous Control



Multi-dimension Gaging



Automatic Gaging

FEDERAL "Electricator"

IT'S VERSATILE. Federal "Electricator" combines the tried and proven features of the Dial Indicator with an electrical power circuit. You can use the "Electricator" for high-speed precision gaging — for precision machine control — for automatic sorting of parts — for controlling processes. In fact, there's practically no limit to the gaging versatility of the "Electricator" . . . or to its ability to reduce waste and cut costs.

IT'S COMPACT. The "Electricator" fits into the same space as a Dial Indicator. A multiple-dimension "Electricator" gage not only shows the size condition on the Dials . . . it reveals faulty workpieces instantly by flashing a *single* control signal. You can't beat it!

IT'S A PRODUCTION TOOL. For controlling plunge-cut grinding, for continuous process control, for automatic high-speed sorting, the "Electricator" pays off in greater precision and increased inspection output. Take the automatic grinding gage, for example. You get up to twice as many parts per hour from your machines and *no waste* — these parts are 100% O.K. within a tenth (.0001").

You can get profit-making, cost-cutting help with the Federal "Electricator". Write for more information. Federal Products Corporation, 1196 Eddy Street, Providence 1, R. I.

FEDERAL

Largest manufacturer of indicating type gages . . . exclusively.

USE READER SERVICE CARD; INDICATE A-6-114-1

How TO REDUCE REJECTS!

Spoilage losses in tapping and reaming, due to misalignment of the work with the spindle, can be reduced surprisingly, many find, by simply changing over to a different type of toolholder—a Ziegler Floating Holder —because the Ziegler automatically compensates for alignment inaccuracies of as much as $\frac{1}{32}$" radius or $\frac{1}{16}$" diameter. Try it and see!

The Ziegler Holder, because of its floating action, enables the tool to do a perfect job even though the work may not be perfectly aligned.

In the rejects it eliminates, the Ziegler Holder pays for itself many times over in a remarkably short time. Try it in comparison with any other tool holder on the market and see for yourself how much better work it does.

W. M. ZIEGLER TOOL COMPANY

13570 AUBURN DETROIT 23, MICH.

WRITE FOR CATALOG

Ziegler ROLLER DRIVE **FLOATING HOLDER** for Taps and Reamers...

USE READER SERVICE CARD; INDICATE A-6-114-2

Harden Steel *Clear Through* with

HI-SPEED-IT

The entire molecular structure is changed throughout, not just on the surface. A piece of 1020 cold rolled steel has an easily identified grain structure. Treat it with these compounds for, say, six hours and the structure examined under a microscope, shows a complete change as much as 2" deep to the nature of a hard alloy steel. Such examination is encouraged, because until then the metallurgist has never seen such life-giving effect on steel no matter what process has been used.

For visual demonstration phone or write
B. M. WESTON ASSOCIATES
1538 Dime Bldg., Detroit 26, Mich.
WO 3-9595

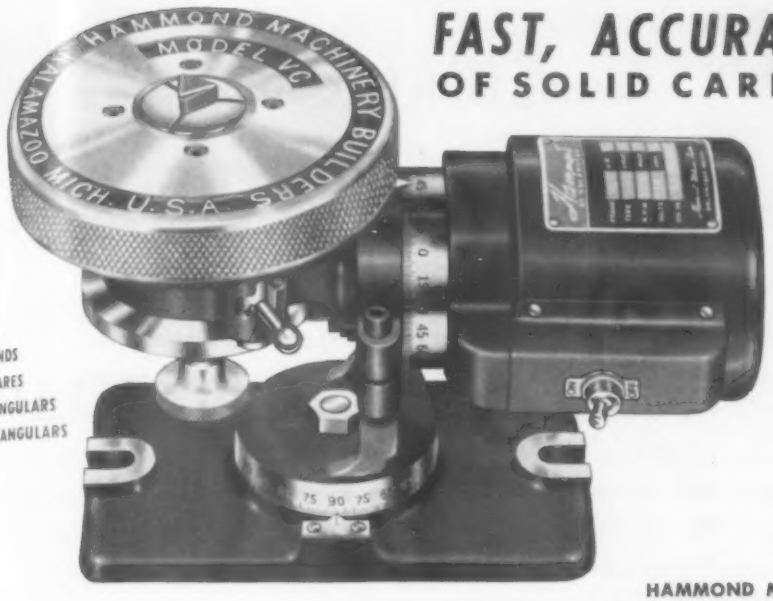
"Technically Right Carbon Products for World Industries"

WILSON CARBON COMPANY, INCORPORATED

60 East 42nd Street New York 17, New York

USE READER SERVICE CARD; INDICATE A-6-114-3

FAST, ACCURATE GRINDING
OF SOLID CARBIDE INSERT TOOLS



FOR
ROUNDS
SQUARES
TRIANGULARS
RECTANGULARS

The NEW Hammond Solid Carbide Insert Grinding Fixture pays for itself in a few weeks. Offers a fast, economical and accurate means of grinding chip breaker grooves in round, square, triangular and rectangular shapes and for rough and finish grinding of dull and damaged carbide inserts. Motorized Style M with lug base can be mounted on most tool and surface grinders and Hammond C-4, CB-76 and CB-77 Chip Breaker Grinders.

MODEL VC, Style M Motorized Solid Carbide Insert Grinding Fixture. Style H, without motor also available. Write for Bulletin No. 701.

HAMMOND MODEL CB-77 CHIP BREAKER AND DIAMOND FINISHING GRINDER can be supplied with both the standard Any Angle Vise and the Model VC Solid Carbide Insert Grinding Fixture.

BUILDERS OF AMERICA'S MOST COMPLETE LINE OF CARBIDE TOOL GRINDERS

Hammond Machinery Builders INC

1661 DOUGLAS AVENUE • KALAMAZOO 54, MICHIGAN

WRITE FOR BULLETIN No. 701

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-96-1

...introducing the NEW
Modernair TRADEMARK AIR RETURN AIR CYLINDER

◄ Your Choice of Mounting Brackets
(Mounting must be specified on order)

No Springs to Break!
Replacement of "O" Rings Renews Cylinder Completely

This revolutionary double-acting cylinder is operated with a single-acting three-way valve. Fast forward thrust without the use of quick release valves is made possible due to total absence of springs or air to be compressed.

There is no residual pressure on the forward stroke. The return stroke is made at 60% efficiency using a three-way valve.

Speed can be perfectly controlled on both strokes.

Though it is, in effect, a double-acting cylinder, it requires only half the volume of air needed to operate a double-acting cylinder.

For light punch and die work, Modernair cylinders are piston keyed to eliminate rotation.

Patent Applied for.

Aluminum head construction; hard-drawn, relief-annealed brass tubing; stainless steel piston rod. 1⅛-In., 1⅝-In., or 2⅛-In. bore sizes.

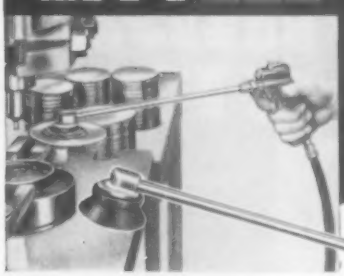
FOR DESCRIPTIVE BULLETIN — WRITE:

Modernair TRADEMARK CORPORATION

4222 HOLLIS STREET • OAKLAND 8, CALIF.

USE READER SERVICE CARD; INDICATE A-6-96-2

LITTELL Pres-Vac SAFETY FEEDERS



30 Pres-Vacs cost less than the average cost of only one punch press accident.

Operated by Compressed Air

1 BOOST PRODUCTION 20% to 100%
—Reported by Users.

2 ELIMINATE DIE BREAKAGE
—Assures Feeding Blanks One at a Time.

3 INCREASE OPERATORS' SAFETY
—Punch Press Accidents Eliminated.

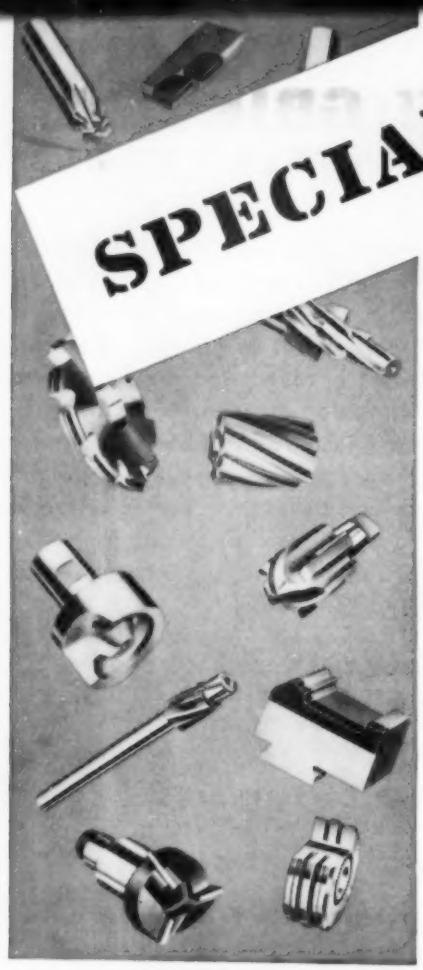
4 CUT INSURANCE COSTS
—Fewer Accidents Mean Lower Premiums.

Littell Pres-Vac Safety Feeders are made in single and multiple types in a variety of cup sizes and styles.

F.J. Littell MACHINE CO.

4201 RAVENSWOOD AVENUE, CHICAGO 13, ILL.

USE READER SERVICE CARD; INDICATE A-6-96-3



Cutting tools by Gorham are

just that!

Whatever your needs in special high speed steel and carbide tipped cutting tools—you can be sure of one thing: The name GORHAM means top performance and lasting quality . . . the most for your money in any tool you buy. Long experience in the selection and heat treating of metals has put GORHAM in the front rank of America's leading tool makers. You can depend on GORHAM to deliver *special* service . . . you can count on GORHAM for *special* results! Specify GORHAM for all your cutting tool needs.

GORHAM TOOL COMPANY

14400 WOODROW WILSON • DETROIT 3, MICH.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-116-1

Columbia TOOL STEEL

ALL OVER U.S.A.

Chicago, Cincinnati, Cleveland, Dayton, Detroit, Erie, Grand Rapids, Houston, Los Angeles, Milwaukee, Moline, Portland, St. Louis, St. Paul, San Francisco, Upper Montclair

—there are trained capable "Columbia" men to serve you

COLUMBIA TOOL STEEL COMPANY

ARTHUR T. CLARAGE, PRESIDENT

MAIN OFFICE AND WORKS

520 EAST 14TH STREET • CHICAGO HEIGHTS, ILL.

USE READER SERVICE CARD; INDICATE 6-116-2

For Low-Cost Precision Measuring—

GRANITE SURFACE PLATES

Produced by Nature — Perfected by Herman Stone

Durable • Accurate • Economical

The inherent hardness and durability of granite, accurately finished to a guaranteed tolerance of .00005", provide the most efficient and economical surface plates for precision measurement operations. Sizes up to 8' x 16'.

★ *Non-Magnetic* ★ *Can Not Warp* ★ *Corrosion-proof*

Write for Free Trial Offer

THE HERMAN STONE COMPANY

324 Harries Bldg. • Dayton 2, Ohio

USE READER SERVICE CARD; INDICATE A-6-116-3

EFFICIENT—LOW COST PRODUCTION

MEANS ROUSSELLE PUNCH PRESSES

O. B. I. PRESS — HORN PRESS — DEEP THROAT

WRITE FOR DETAILS

SERVICE MACHINE COMPANY

7627 S. Ashland Ave. • Chicago 20

USE READER SERVICE CARD; INDICATE A-116-4

10 MILLION GALLONS OF *Lusol* SOLUTION

HAVE REVOLUTIONIZED SHOP THINKING

ON MACHINE SPEEDS ✓ TOOL LIFE ✓ PRODUCTION COSTS ✓

It is no longer a matter of opinion — 10 million gallons of Lusol solution have been used in exhaustive testing and practical plant applications. It is being used with such success in some of the country's leading plants that they are chary about specific publicity to their competitors.

AN ENTIRELY NEW CONCEPT ON COOLANTS

Cooling, rather than lubrication, at point of tool contact has made possible 300% to 400% greater speeds, less tool wear, less tool breakage, finer finish, greatly increased production . . . a concept many won't believe until they have tried Lusol . . . a concept Lusol users enthusiastically accept and are using today to their competitors' discomfort.

OPERATORS ARE BOOSTERS

Take the operator who has his hands in coolant all day long — give him Lusol that is clear and clean — like a mild soap solution — no skin irritation — a clean machine — a clear solution that allows him to see his work as the finest drill comes down to the work piece — perfect vision — easier to work with — it changes the whole working aspect of a shop — clothes and shoes no longer soaked in old type coolants. Add to this fewer tool changes, less wheel dressing, far greater speeds, and production picks up with less effort, less operator fatigue. We've never found an operator yet who wants to go back to the "old way."

CUT 10 TIMES FASTER ON 18-8 STAINLESS

A bar of 18-8 stainless steel was being cut in 20 minutes. When Lusol was used with the same size bar, same material, same operator, same machine, same tool, the cutting was done in 2 minutes.

Hard to believe, and all Lusol results are hard to believe unless you can accept an entirely new concept of the use of coolants. Lusol cools —rather than lubricates. On the case above, speeds were increased from 30 RPM to 267 RPM. Previously the operator had been breaking tools with fair regularity. Since using Lusol he has broken none. Old type coolants had kept the operator constantly annoyed with skin eruptions. Since using Lusol he has had none.

SOONER OR LATER

Sooner or later someone is going to ask you why you haven't checked into Lusol before. Sooner or later you are going to find out that it does just what the first 10 million gallons have proved. Investigate this way to improve your production NOW. It's more profitable to lead than follow.

LOOK AT THESE FIGURES . . .
THEN SEND FOR THE CASE HISTORIES

BROACHING

- 266% greater production per broach grind
- 275% greater production per broach grind
- 125% greater production per broach grind
- 128% greater production per broach grind

DRILLING & TAPPING

- Saved 70% Drills, 68% Taps
- Tap life increased 1300%
- Drill life increased 3300%
- Saved 90% Drills, 75% Taps

GRINDING OPERATIONS

- Grinding time reduced 25%
- Saved 97½% scrap
- Over 200% more pieces per wheel dressing

CASE HISTORIES YOU CAN'T AFFORD TO OVERLOOK

Lusol

SAVES TOOLS ▼ SPEEDS WORK CUTS COST

NATIONAL DISTRIBUTION . . . WAREHOUSE STOCKS

F. E. ANDERSON OIL COMPANY
224 Brownstone Ave., Portland, Conn.

Please send me your case history material on:
☐ Broaching ☐ Drilling, Tapping ☐ Grinding

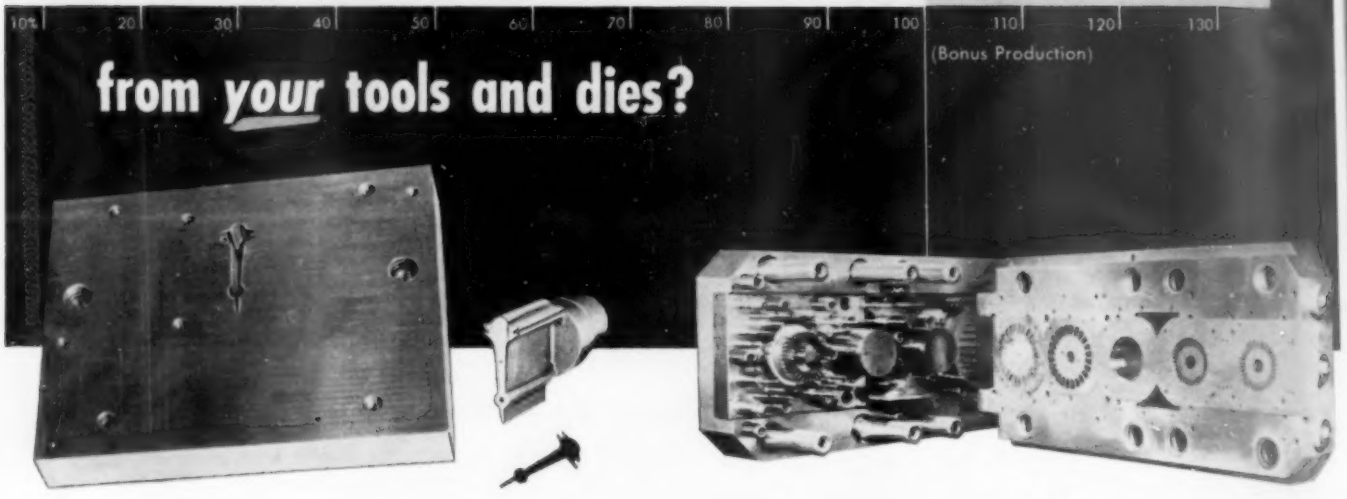
Name

Company

Address

2AN50

why be satisfied with "EXPECTED PRODUCTION" from *your* tools and dies?



Production Was "Satisfactory"
. . . But This Toolmaker Wanted MORE:

Output from this blanking die and punch seemed O.K. Yet the toolmaker, not content with only "passable" performance, re-examined the tool steel used. With the Carpenter Matched Set Method as a guide, he was able to put his finger on the one steel best suited for the job. Now, with No. 610 (Air-Wear), output has increased over 200%—and the die runs *4 times* longer between grinds. What a return—simply because he wasn't satisfied with "good enough"!

28% MORE Parts Between Grinds
. . . Because "Expected Production" Wasn't Good Enough:

Everyone agreed: This intricate die for blanking motor stator and rotor laminations from abrasive 2½% silicon steel was performing up to normal expectations. But that didn't stop them. Going just one step further, the toolroom foreman selected HAMPDEN (Oil-Wear) from the Carpenter Matched Set. Now the die is giving 28% more parts per grind—thus reducing downtime and regrinding expense. It really pays to go after *more* than "Expected Production"!

These jobs aren't the "one-in-a-million" variety. Results like these are being duplicated all over the country—because tooling men are no longer satisfied with "Expected Production" once they use the Carpenter Matched Set Method. And this Method is amazingly easy to put to work. One of its biggest advantages is the *simplification* it gives you—simplification of selection, heat treatment, and inventories. Prove it to yourself—it's easy. Simply pick out a job—put the Matched Set Method to work—then compare results!

Export Department, Woolworth Bldg., New York 7, N. Y. "CARSTEELCO"

—And you can get IMMEDIATE DELIVERY from LARGE STOCKS!

The Standard Tool Steels of Industry

Carpenter

MATCHED

TOOL & DIE STEELS

Offices and Warehouses in Principal Cities Throughout the U.S.A. and Canada

THE CARPENTER STEEL COMPANY, 154 W. Bern St., Reading, Pa.

Valuable Information...

● Bay State mounted abrasive products are unsurpassed for:

UNIFORMITY of density and hardness
POSITIVE ADHESION of wheels to spindles
PRECISE SHAPE, SIZE and **TRUTH**

Available in a wide range of shapes, sizes & specifications.

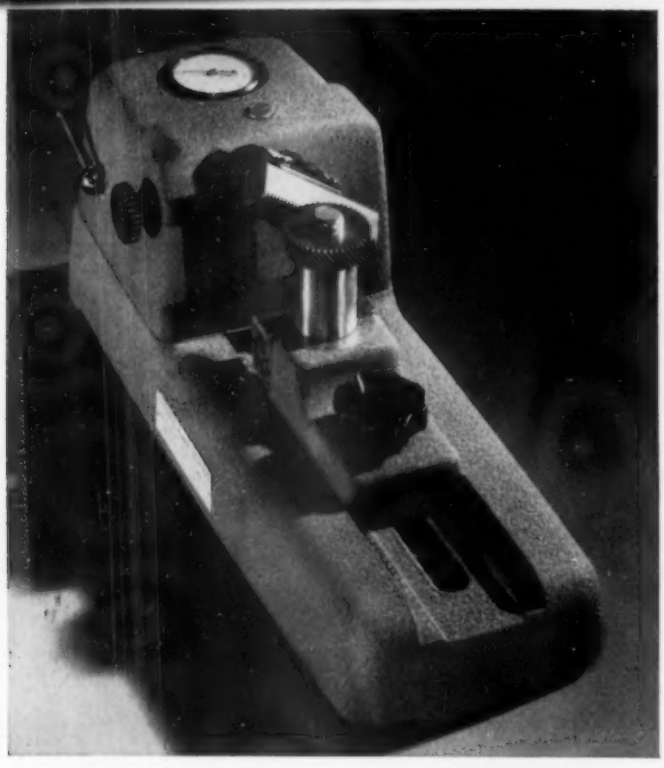
BAY STATE ABRASIVE PRODUCTS CO.
WESTBORO, MASS.—*Chicago, Cleveland, Detroit, Pittsburgh*
Distributors — All Principal Cities

This new handbook catalog is full of valuable data. We will be glad to send it on your request.

To Bay State Abrasive Products Co., Westboro, Mass.
Please send your new mounted wheel, mounted point catalog.

Company.....
Street.....
City..... State.....
Individual.....

BAY STATE®

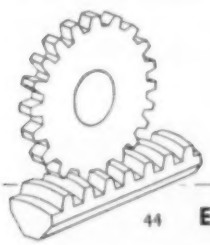


NEW PRINCIPLE CHECKS GEARS AT MACHINE SIDE easily and accurately

The Kodak Backlash Gage is a machine-side application of the Kodak Conju-Gage principle, a time- and money-saving method for passing every good gear, rejecting every wrong gear.

Built especially for the needs of the men who machine your gears. A great help in setting up accurately and in holding backlash and size tolerances *with respect to the hole.* Avoids clumsy manipulation involved in old-fashioned methods.

Fully illustrated twelve-page booklet describes the Kodak Backlash Gage and the Kodak Conju-Gage Gear Checker principle. It's full of new ideas on gear-testing. Write for it.



Kodak

CONJU-GAGE

44 **EASTMAN KODAK COMPANY**

Industrial Optical Sales Division

Rochester 4, N. Y.

Please send your booklet on the Kodak Conju-Gage.

NAME_____

COMPANY_____

ADDRESS_____

CITY_____

ZONE_____

STATE_____

Kodak TRADE-MARK

USE READER SERVICE CARD; INDICATE A-6-120-1

Severance CHATTERLESS TOOLS HIGH SPEED CARBIDE

Winning their way on job after job, they are carefully designed to preclude chatter and can be depended on to produce superior finishes.

• • • • •

Severance CHATTERLESS COUNTERSINKS

STANDARD TYPE — Stocked in 13 diameters up to 2" and in 30°, 41°, 45°, and 60° angles (with C/L).

Sizes 1" and larger stocked also threaded for shanks — tapered or straight — in various sizes.

Use CARBIDE for tough jobs or high production.

HEAVY DUTY TYPE — Features larger shanks having a tang drive. Full range of sizes and angles.

HEADQUARTERS FOR COUNTERSINKS, REAMERS, SEATING TOOLS, and SPOTFACERS that preclude chatter.

Severance CHATTERLESS BALL SEAT REAMERS

Standard and Heavy Duty Types 8 sizes each. Made also for shaped cavities — as ordered.

BALL NOSE DRILLS — In corresponding sizes hog out the stock for Ball Seat Reamers.

Severance TAPER REAMERS

- Faster cutting
- Better finishing
- Shear-cut teeth

Tapers up to 15° quickly supplied from stock — up to 1⅛" diameter x 2¾" long.

Unexcelled for holes having keyways, ports, splines, cross holes, etc.

Write for Catalog

SEVERANCE TOOL INDUSTRIES, INC.

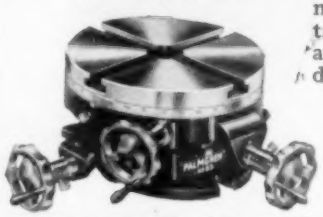
728 Iowa Ave. Saginaw, Michigan

USE READER SERVICE CARD; INDICATE A-6-120-2

DUAL CROSS and ROTARY FEED

PALMGREN Rotary, Index MILLING TABLE

No. 83 Only $49.50



Has 8" table, 360° movement and 4" cross feed travel. Adjusting wheels and dials graduated in degrees and thousandths.

Slotted for bolting to table. No. 82 without rotary feed $39.75.

Write for Circular No. 354

CHICAGO TOOL and ENGINEERING CO.

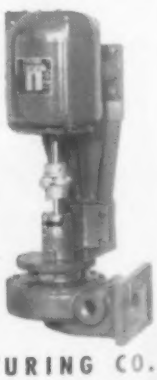
8391 South Chicago Ave. Chicago 17, Ill.

USE READER SERVICE CARD; INDICATE A-6-120-3

PUMPS IN COMPLIANCE WITH J. I. C. STANDARDS

PIONEER Pumps

HIGH EFFICIENCY • LOW POWER CONSUMPTION
GREATER VOLUME AND LESS MAINTENANCE

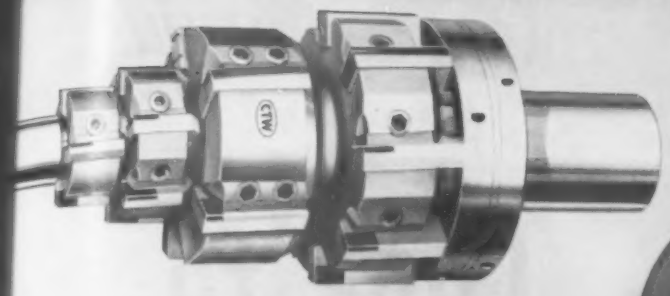


FOR EVERY INDUSTRIAL COOLANT AND LUBRICANT APPLICATION

PIONEER PUMP & MANUFACTURING CO.

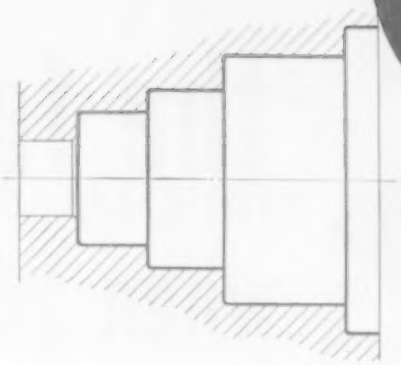
19645 John R Street • Detroit 3, Michigan

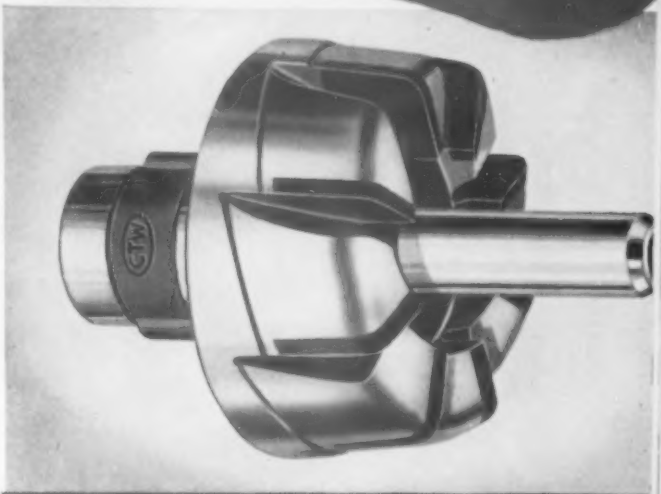
USE READER SERVICE CARD; INDICATE 6-120-4



Need Special CUTTING TOOLS?

Continental special cutter with carbide tipped inserted blades has a roller pilot which guides the tool as it finishes four concentric diameters and four shoulders. The drawing shows the cuts in heavy lines





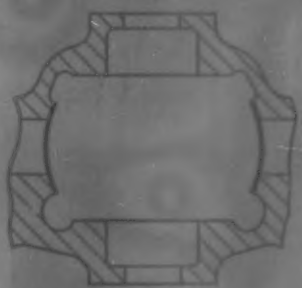
CONTINENTAL

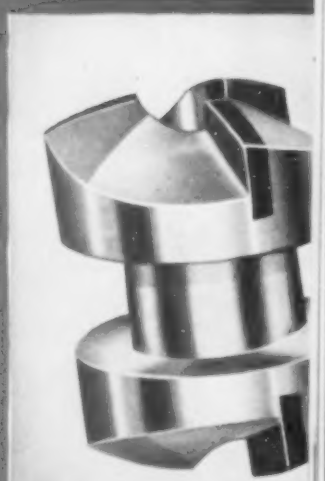
DESIGNS THEM TO SUIT YOUR NEEDS EXACTLY

Those high production jobs that have to show a profit are everyday problems at Continental. The Continental Cutting Tool Division of Ex-Cell-O designs and manufactures all the special cutting tools that are used in the Ex-Cell-O Organization. Continental Tools of all types are used day after day on gruelling production work that must pass rigid inspection and must be done at a profit.

Whether the job calls for high-speed steel, cast alloys or carbides, Continental can supply the tools to suit the job *exactly*. The new Continental Tool Catalog shows hundreds of cutting tools, standard and special, and broaches. If you haven't received a copy write for one today on your company letterhead. And for special tools just send a tool print or a part print showing operations to be performed and ask for a quotation.

This special Continental tool taper reams, forms a radius and hollow mills. Operations are indicated in heavy lines in the drawing.





Continental double-end carbide tipped spherical cutting tool used in a special machine for finishing two inside curved automotive differential cases.

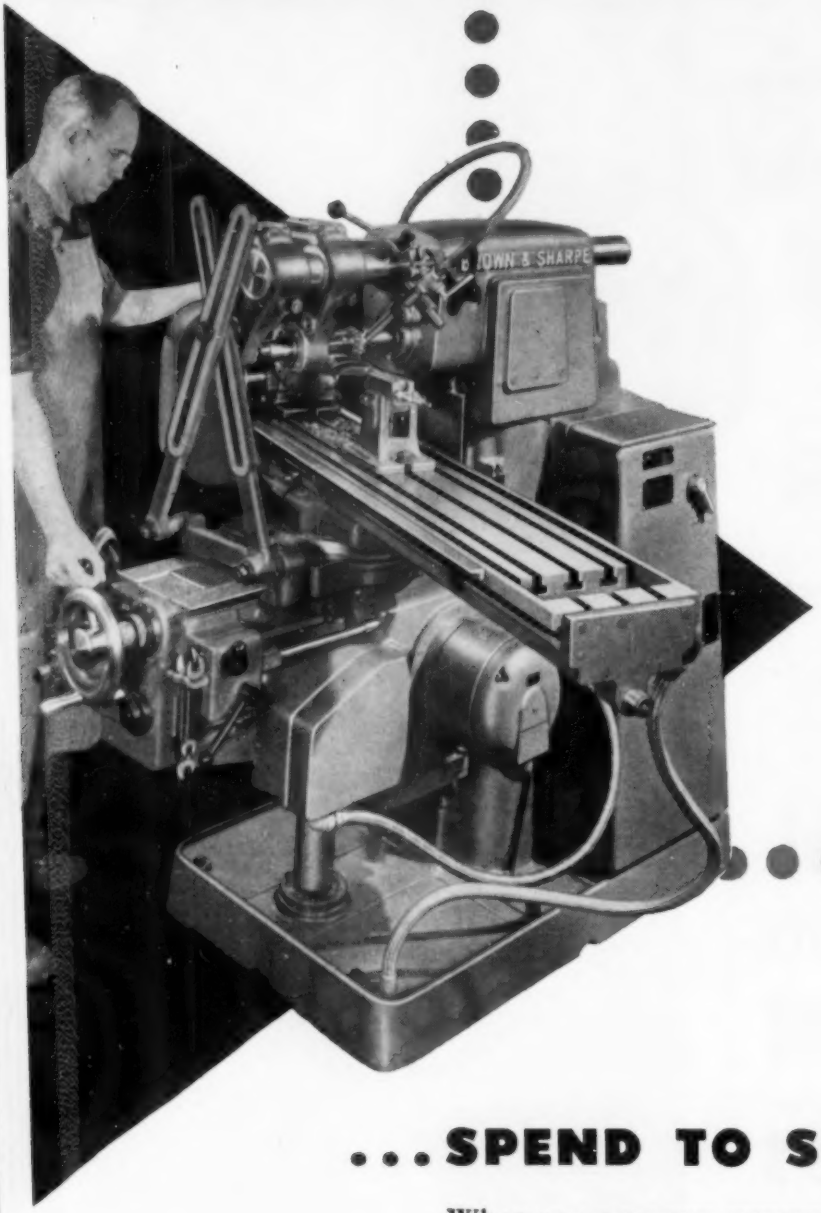
CTW

50-19

CONTINENTAL TOOL WORKS

Division of Ex-Cell-O Corporation

DETROIT 32, MICHIGAN



Look to the future when you buy ...for the present...

...SPEND TO SAVE

When you get extra returns, *far into the future,* on your investment in today's machine tools and equipment . . . you *spend* to *save.* You gain not only immediate advantages . . . simplified operation, high accuracy and convenient versatility . . . but also an extremely long productive life. These are the recognized advantages of Brown & Sharpe precision-built machines . . . highly profitable to industry the world over.

Investigate the Brown & Sharpe line before you buy for the present. *Spend to save.* Complete information about any machine sent on request. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

BROWN &

MILLING MACHINES

Universal
Plain (including manufacturing type)
Vertical

GRINDING MACHINES

Universal
Plain
Surface
Cutter and Tool

SCREW MACHINES

Automatic (including screw threading, pinion turning and cutting-off types)
Wire Feed

RECENT MACHINE TOOL DEVELOPMENTS

2L and 2LB Surface Grinding Machines—automatically lubricated—for trouble-free, precision surface grinding under extra dusty or severe operating conditions.

Automatic Cycle and Spark-Timing Arrangement automatically controls spark-out time.

Polishing and Finishir Machine—a complete unit f faster polishing, burri and filin

Electralign, an exclusive new development, for electronic alignment of grinding machine swivel tables.

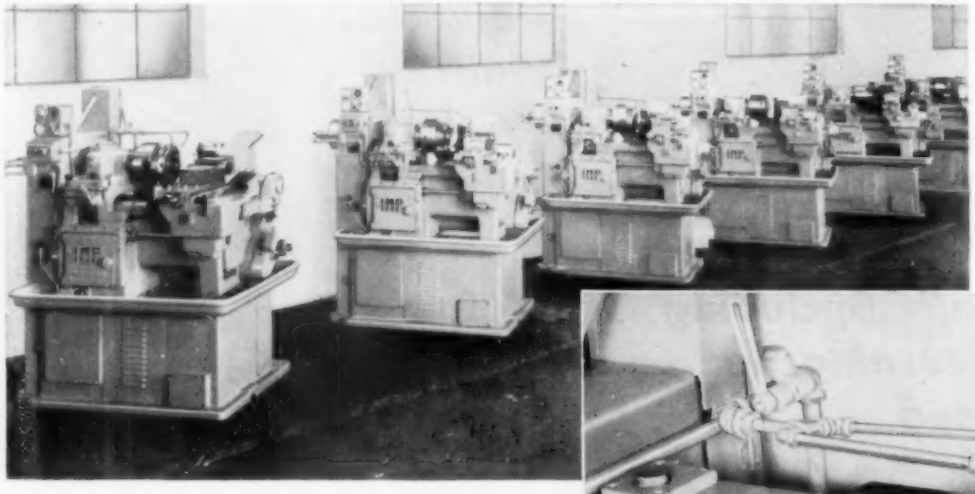
Automatic Cycle and Sizing Arrang ment automatically sizes from the work.

SHARPE

B·S

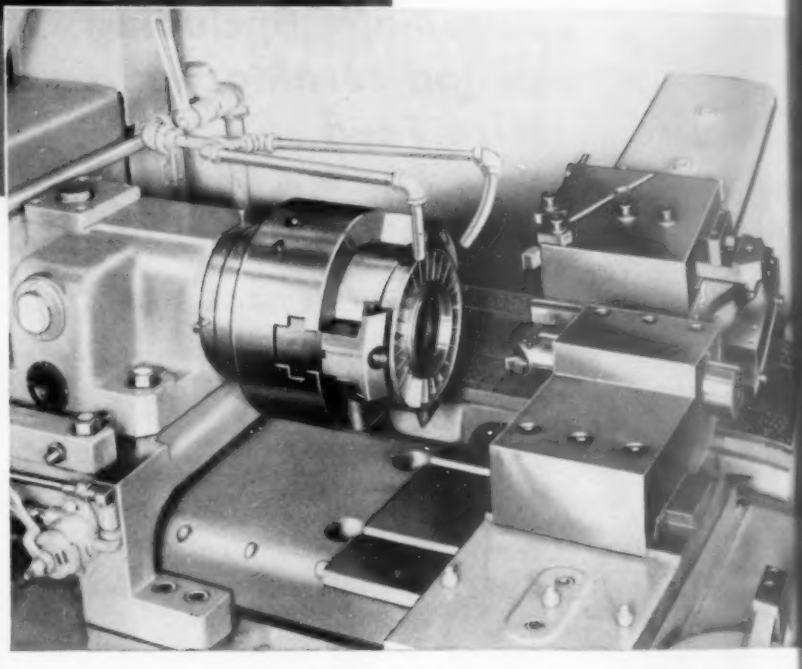
MACHINE OF THE MONT

PREPARED BY THE SENECA FALLS MACHINE CO. **"THE Lo-swing PEOPLE"** SENECA FALLS, NEW Y



Left: Several of a group of Lo-swing IMP's used in machining Automatic Transmission Parts.

Below: Close-up view of tooling.



AUTOMATIC TRANSMISSION PARTS MACHINED AUTOMATICALLY ON Lo-swing IMP

Problem: To bore and face welded Torque Converter Stator Assemblies. Parts must be held without distortion and machined within close limits.

Solution: IMP Automatic Lo-swing Lathes were selected for this work due to ease of operation, high spindle speeds, compactness and rigidity. The upper illustration shows several of a group of machines installed for this class of work. The lower illustration shows one of the lathes, with coolant guard removed, equipped for boring and facing one of the Torque Converter Stator Assemblies. The part is held in a three-jaw, air-operated chuck fitted with wide mushroom ty jaws to prevent distortion of the piece. T boring operation is made with two carbi tipped tools mounted in a boring bar and hold and fitted to the front slide. Tool relief is p vided on the return stroke. The facing and tri ming tools are mounted on a template contr led rear tool block which permits the faci operation to be made at the correct angle. T operation is entirely automatic, the operat simply loads and unloads the parts.

Engineered jobs are our specialty. Our staff at your disposal to help solve your problem

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH Lo-swing

AUTOMATIC

Multiple Transfer

PRESSES

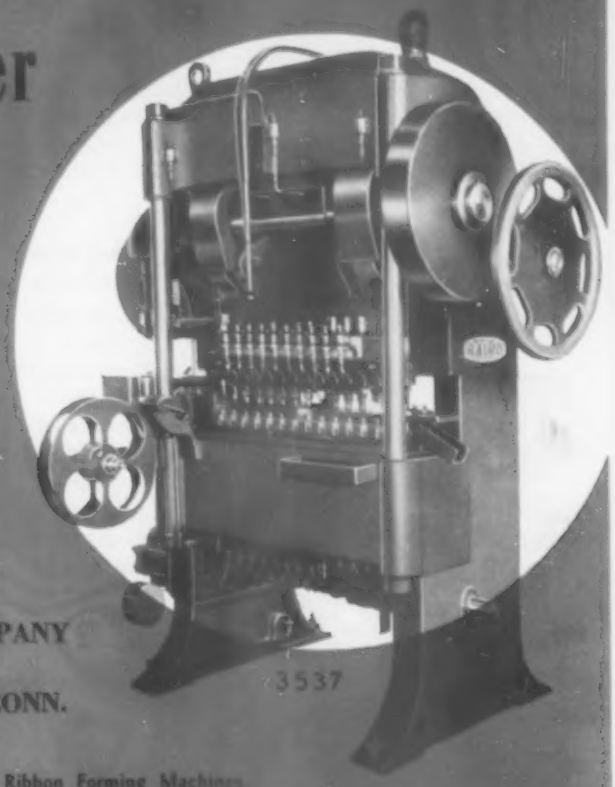
(Available in Five Sizes)

For those parts made from ribbon metal stock which can be made to best advantage on this Baird Multiple Transfer Press.

Different combinations of crank and cam actuated slide, roll and slide feeds, to best suit the job in hand.

Send your samples and prints, quantity requirements and

ASK BAIRD ABOUT IT



The **BAIRD** MACHINE COMPANY

STRATFORD, CONN.

Baird also builds Automatic Wire and Ribbon Forming Machines, High Production Machine Tools, Chucking Machines, Automatic Presses, Tumblers

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-125

HANDBOOK WINS AGAIN!

Proclaimed Tops in field at recent ASTE (Cost-Cutting) Industrial Exposition. Contains up to the minute information that you cannot afford to be without.

DON'T DELAY

ORDER YOURS NOW!

PRICE

Members $11.00

Non Members $15.00

using the ASTE Handbook
Over 15,000 men are now

Please send the "Tool Engineers' Handbook" to the address below:
Payment enclosed in the amount of $..... Orders shipped to Canada will enter the country duty and tax free. Remittance may be made in Canadian funds at the same prices. Shipments to other countries are subject to import regulations.

Name .....

Chapter (if member) .....

Business Title ..... Firm Name .....

Street Address .....

City ..... Zone .... State .....

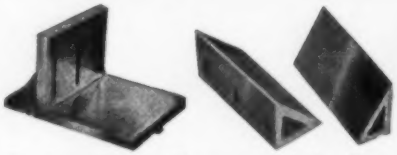
Remittance payable to the Society must accompany order. Do not send currency. Mail this order coupon or a facsimile to: American Society of Tool Engineers, Dept. 3, 10700 Puritan Ave., Detroit 21, Mich.

IMPORTANT—In order to obtain the special, member price of $11, orders must be sent to the Society.

EXACT MEASUREMENTS REQUIRE PRECISION TOOLS

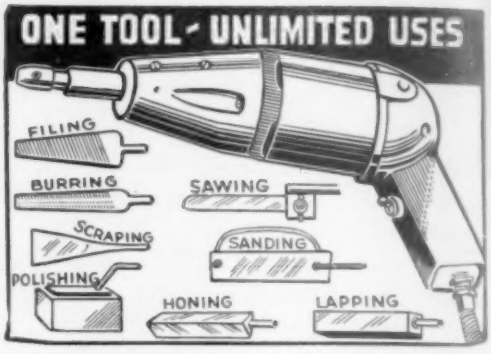
Accuracy of measurement depends on the precision of the measuring tools. Provide your Shop and Inspection Department with dependable and proper inspection tools. MEEHANITE METAL TOOLS, made to close tolerances, are furnished in many types.

Surface Plates
Box Parallels
Slotted Angle Plates
Universal Right Angles
Flat Parallels
Lapping Plates
Toolmakers' Knees
Straight Edges
Masterangle Plates
Angle Attachments



Surface Plates Rescraped Like New

CUT PRODUCTION TIME!



Use these Handy PORTABLE, ELECTRIC RECIPROCATING TOOLS for Greater Production, Better, More Uniform Work—All with less Operator Fatigue. Fixed strokes are 1/8" or 3/8" long. Operate on 110 Volts AC-DC. Deliver 1000 PUSH-PULL strokes per minute. Try one of these tools on your next job.

PRECISION PRODUCTION TOOLS

ACME TOOL COMPANY

75 West Broadway New York 7, N. Y.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-126-1

Special CUTTING TOOLS

with

GUARANTEED PERFORMANCE

Detroit Reamer & Tool Co. has specialized in the design and manufacture of special cutting tools of H.S.S. and carbide for 12 years. This experience qualifies them to help you with the design of special cutting tools that are *guaranteed* by Detroit Reamer to give specified performance. In addition, their shop facilities are geared for the making of "specials" and that means lower costs to you . . . positive assurance for you of dependable cutting tools at lowest cost. Have our engineers look over your cutting tool problems or quote on your own designs.

H. S. S. or CARBIDE TIPPED

D R & T COMPANY

DETROIT REAMER & TOOL CO.

Mfrs. of Special High Speed Cutting Tools

2830 East 7 Mile Rd. Detroit 34, Michigan

USE READER SERVICE CARD; INDICATE A-6-126-2

TO OBTAIN FURTHER INFORMATION ABOUT ADVERTISERS, TRADE LITERATURE OR TOOLS OF TODAY APPEARING IN THIS ISSUE OF THE TOOL ENGINEER, USE THE HANDY READERS SERVICE CARD ON PAGE 73.

No Postage Needed

NEW!

Hardened Steel Insert

Model P with quick-acting clamps ideal for production runs.

Lassy WORK HOLDER

Indispensable for many operations.

Its design permits set-ups with repeated work accuracy at low cost.

LASSY TOOL CO., Plainville, Conn.

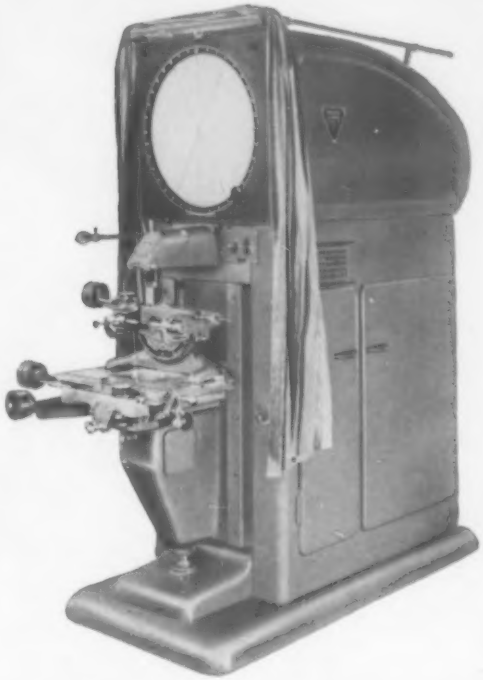
Makers of Famous LASSY TAPPING MACHINES

USE READER SERVICE CARD; INDICATE A-6-126-3

LOWER COSTS OF PRODUCTION OF INSPECTION

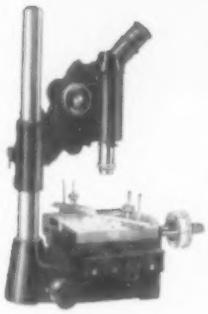
WITH THESE
BAUSCH & LOMB PRECISION INSTRUMENTS

CONTOUR MEASURING PROJECTOR



You save time and money by assuring *more accurate measurements than any other projector can give you.* You get angular measurements to ± 1 minute of arc, with the protractor screen. You get direct linear measurements to ± .0001″ over a range of 4″x6″, with the cross slide stage.

You save time and money by spotting inaccuracies quickly and simply. Dimensions, angles, and profiles of production-run parts can be compared directly with a *traced outline* of the projected image of the master part, or with a large scale drawing superimposed on the screen. Catalog D-27.



TOOLMAKERS' MICROSCOPE

Linear measurements to ±.0001″, and, when fitted with a protractor eyepiece, angular measurements to ± 1 minute of arc, can be made with this sturdy microscope. Operation is extremely *simple* and *fast*. Opaque and transparent objects of any contour can be measured. *Catalog D-22.*

STEREOSCOPIC WIDE FIELD MICROSCOPES

Provide clear, sharp, 3-dimensional, unreversed, magnified images. Used extensively in industry for greater speed and accuracy in small parts assembly operations, inspection of tools and finished parts, and precision machining of small parts. 15 models for many uses. *Catalog* D-15.

New PARA-PLANE GAGES

Now you can have "laboratory" accuracy of 0.000001″ in the determination of flatness and parallelism of reflecting surfaces . . . with production-line *simplicity* and *speed*. So simple that an unskilled operator can make measurements after a few minutes of instruction.

Two sizes of Para-Plane Gages are available: the larger (top) tests objects up to 6″ in diameter; the smaller (bottom) tests up to 3″ in diameter. *Bulletin* D-224.

WRITE for complete information on these five important optical aids designed to help you save time and money. You may be paying many times over their cost in lost time and rejects. Send your request to Bausch & Lomb Optical Company, 763 St. Paul Street, Rochester 2, New York.

BAUSCH & LOMB
OPTICAL COMPANY ROCHESTER 2, N.Y.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-131

The *knurling* on the head of the UNBRAKO Socket Head Cap Screw saves valuable assembly time because the UNBRAKO can be screwed in faster and further with the fingers—the handiest of all wrenches—before a wrench is needed. The slip-proof knurling "gears" the screw to the fingers, even when they are oily or greasy . . . this is especially important in the smaller sizes.

So, use Knurled UNBRAKO Socket Head Cap Screws and *save time and money.*

Write for further information.

Knurled Head Socket Cap Screws
Flat Head Socket Cap Screws
Self-Locking Socket Set Screws

SOCKET **UNBRAKO** SCREWS

Knurled Head Shoulder Screws
Precision-Ground Dowel Pins
Fully-Formed Pressure Plugs

SPS **STANDARD PRESSED STEEL CO.**
JENKINTOWN 37, PENNSYLVANIA

New BESLY Grinder...

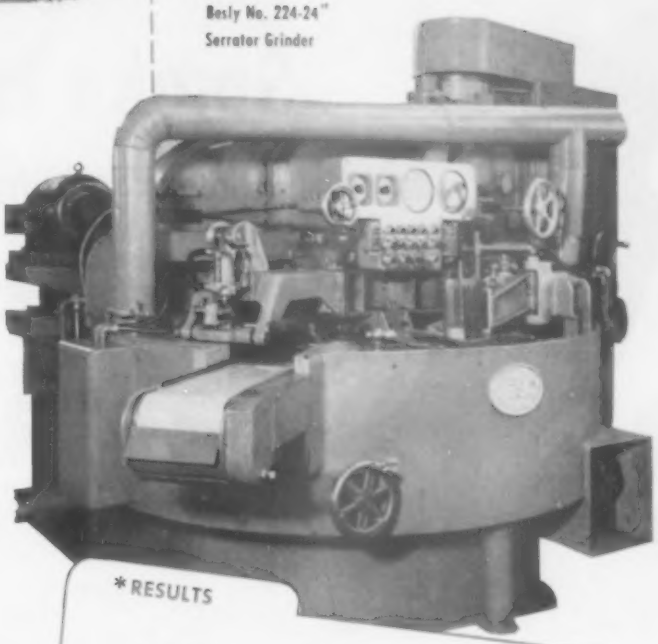
...turns out

15,000

serrated

ledger plates

per 8-hr. shift!



Besly No. 224-24"
Serrator Grinder

RESULTS like these are your pay-off for choosing BESLY

*RESULTS

. . . 15,000 serrated ledger plates every 8 hrs. Hardened plates are bevelled and serrated in one operation at the rate of 32 per minute in this new automatic-feed Besly No. 224-24" Serrator Grinder. Finished sections are serrated at the same rate. Besides much faster production, these results have been realized: greater uniformity—less noise—fewer rejects—less time loss for wheel dressing. Change-over time for various size units is reduced to *seconds!*

*RESULTS

. . . 329 gear cases per hour—tolerance .005" Gear cases are 18" in diameter x 6¼" thick. Stock removed, 1/32" thick. Both faster production rates and closer tolerances are achieved. This new Besly No. 372 Vertical Spindle Roto-Rotary Wet Grinder has 72" abrasive wheel and 4 spindles. Each working station holds 2 castings.

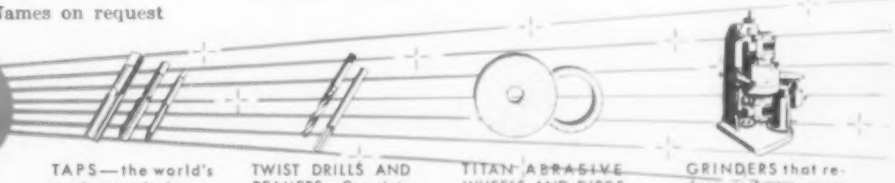
*RESULTS

. . . 2400 wrenches per hour—300% increase Quality markedly improved—all four surfaces accurately ground—ends free from taper. This Besly Double-Spindle Wet Grinder has magnetic vibrator and automatic chain feed. Only one pass through grinder is necessary.

Call in the man with the grinder facts—the Besly engineer. Let him tell you—frankly—whether Besly can cut *your* grinding costs. Also, he may be able to show you operations where a change-over from another process to grinding can substantially reduce production costs. Such a survey costs *you* nothing—but it may mark the beginning of lower costs . . . better, more accurately finished parts . . . increased output . . . or all three of these for you . . . just as it has for scores of other companies. Write us today!

*Names on request

BESLY



TAPS—the world's most accurate tap.

TWIST DRILLS AND REAMERS—Complete line for every need.

TITAN ABRASIVE WHEELS AND DISCS—individually formulated for your job.

GRINDERS that reduce costs on every type of surface grinding.

CHARLES H. BESLY & COMPANY ● 120 N. Clinton Street, Chicago 6, Illinois • Factory: Beloit, Wisconsin

Automatic Method of Drilling Smoke Holes in Pistons

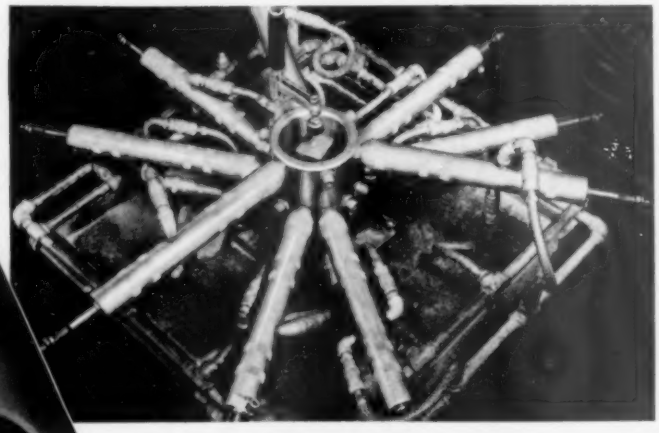
without costly jigs, fixtures or special machine tools

From aircraft engine pistons to Diesel locomotive pistons, Keller Airfeedrills pay production dividends in fast work and extreme accuracy.

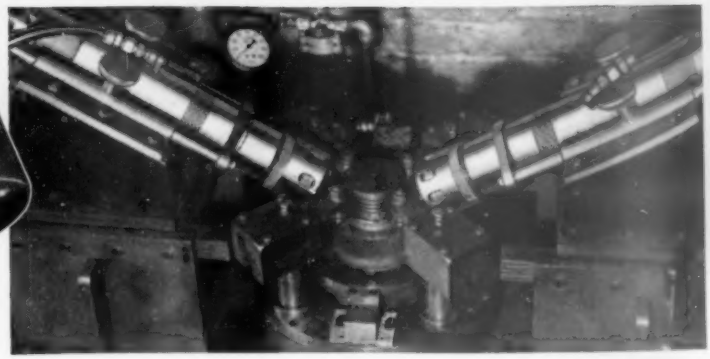
Drilling smoke holes in pistons one at a time is a slow, costly process. To set up a drill press to drill all holes at once is expensive. Manufacturers solve the problem by using Airfeedrills in automatic multiple drilling setups. Self-contained Airfeedrill units can be quickly mounted in fixtures and indexed to drill all the straight or angle holes desired . . . in a matter of seconds.

When not busy on drilling one kind of product, Airfeedrills can be quickly removed for work on other drilling jobs without disturbing the work setup; can be repositioned again for piston work on short notice.

The Airfeedrill assembly consists of the Keller air drill, an air cylinder, hydraulic dashpot, feed control, and stroke adjustment . . . in a rigid housing and operated as a unit.



Simultaneous drilling of 9 smoke holes in aircraft engine piston. Fixture is designed for relocation of Airfeedrills to handle other similar drilling jobs.



Drilling two holes at a time in Diesel engine piston, then solenoid indexing mechanism advances to next position. The drilling job . . . 10 holes in each piston . . . takes only 11 seconds to complete the cycle.

5 GREAT AIRFEEDRILL ADVANTAGES

- Easy and economical to set up
- Fixture setups need not be permanent
- Usable in existing fixtures by mounting Airfeedrills in bushing holes in fixture
- Fast and accurate control of stationary drills when equipped with Keller 4-Way Air Valves
- Available in 5 sizes; drill to ¾″ diameter in steel; 1″ in aluminum, brass, or plastics

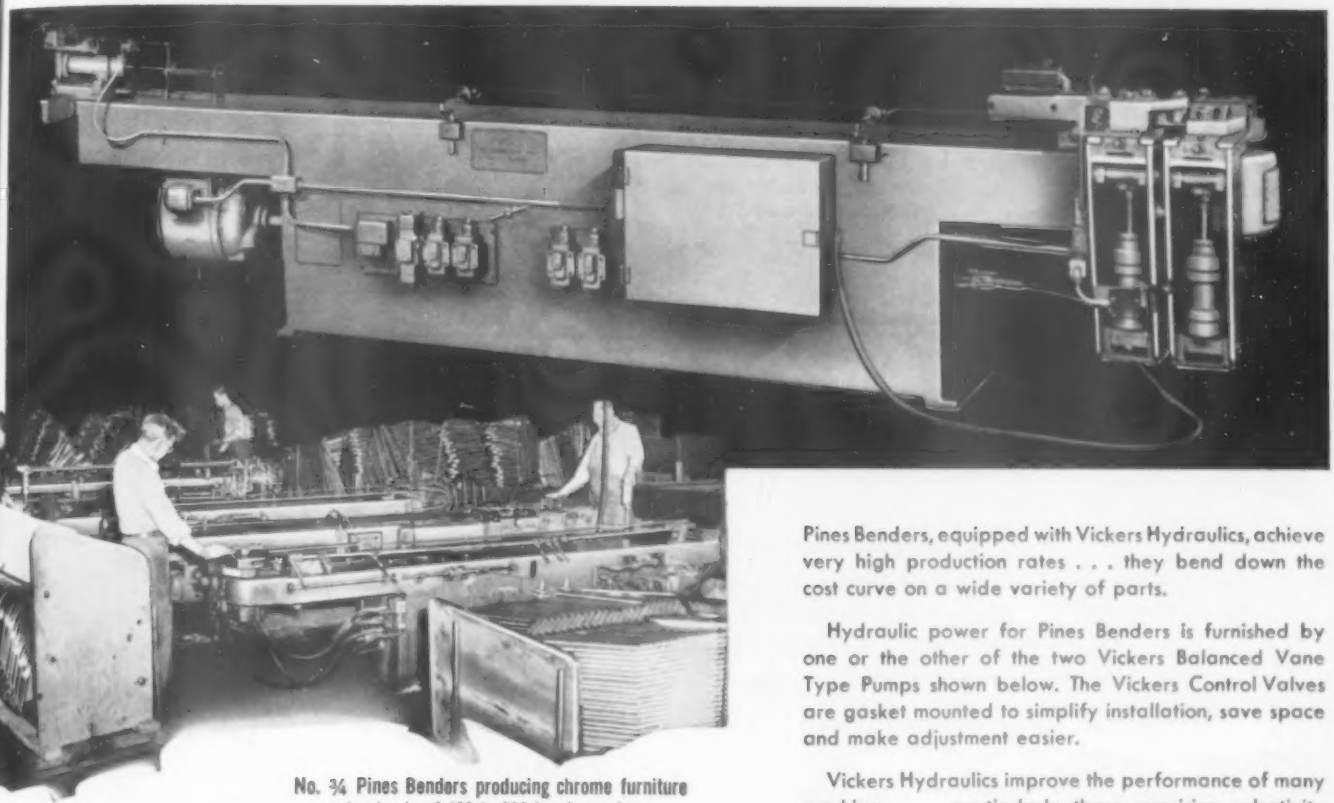
KELLER *Pneumatic Tools*

KELLER TOOL COMPANY
GRAND HAVEN, MICH.

Bending the Cost Curve DOWN

PINES BENDERS

Another Cost-Cutting Application of VICKERS HYDRAULICS



No. ¾ Pines Benders producing chrome furniture parts at rate of 400 to 800 bends per hour.

Pines Benders, equipped with Vickers Hydraulics, achieve very high production rates . . . they bend down the cost curve on a wide variety of parts.

Hydraulic power for Pines Benders is furnished by one or the other of the two Vickers Balanced Vane Type Pumps shown below. The Vickers Control Valves are gasket mounted to simplify installation, save space and make adjustment easier.

Vickers Hydraulics improve the performance of many machines . . . particularly those requiring selectivity of control and adjustment to suit type of work. Any sequence of motions can be provided . . . made automatic if desired. Vickers Hydraulic Equipment is easily protected against overload; incorrect or unsafe operation can be prevented by interlocks. Contact the Vickers Application Engineering Office near you for suggestions on how Vickers Hydraulics can improve your machinery. Write for Catalog 4900.

VICKERS Incorporated

DIVISION OF THE SPERRY CORP.

1416 **OAKMAN BLVD.** • **DETROIT 32, MICH.**

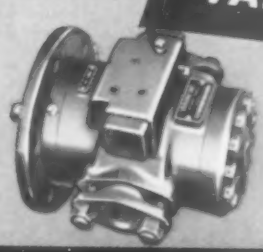
Application Engineering Offices: ATLANTA • CHICAGO • CINCINNATI • CLEVELAND • DETROIT HOUSTON • LOS ANGELES (Metropolitan) • MILWAUKEE • NEW YORK (Metropolitan) • PHILADELPHIA PITTSBURGH • ROCHESTER • ROCKFORD • ST. LOUIS • SEATTLE • TULSA • WASHINGTON • WORCESTER

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

HYDRAULIC POWER BY VICKERS

BALANCED VANE TYPE PUMPS

Smaller Pines Benders use this Vickers Single Stage Vane Type Pump (for 1000 psi continuous operation). Hydraulic balance eliminates bearing loads caused by pressure, assuring longer life.



Larger Pines Benders have this Vickers Two Stage Vane Type Pump (for 2000 psi continuous operation) which has two hydraulically balanced pumping cartridges in one compact housing.

CHAMPION
Precision Expanding Mandrel

Entirely new in principle, this positive drive, quick change work mandrel cuts handling time . . . guarantees concentricity . . . eliminates arbor pressing and collecting.

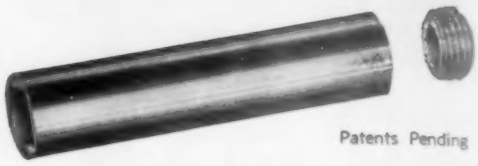
Lower cost production is assured with faster work, fewer rejects, less tool cost. Arbor is built for heavy loads. Sleeve closes at .003" under and opens to .007" over nominal size. Positive stop prevents overstrain. Holds tolerances of less than .0001" run out.

Standard sizes from 1/2" through 3" diameter, graduated by 1/16", fit your machine. Special sizes if required. More details on request.

The **WESTERN** Tool & Mfg. Co., Springfield, Ohio

USE READER SERVICE CARD; INDICATE A-6-132-1

How SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING!



Patents Pending

One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-made square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.

The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.

BUSHINGS MADE IN FOLLOWING SIZES:
3/16, 1/4, 5/16, 3/8, 7/16, 1/2, 5/8, 3/4, 1"

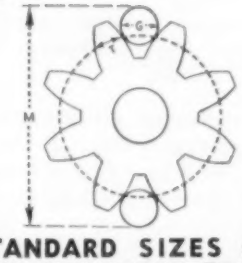
STURDY BROACHING SERVICE
23520 TELEGRAPH RD., DETROIT 19, MICH.

Write for Literature

USE READER SERVICE CARD; INDICATE A-6-132-3

THE *Van Keuren*

simplified GEAR MEASURING SYSTEM



is the most accurate and economical method of measuring tooth thickness of external and internal spur gears, helical gears and involute splines.

◀ *External Spur Gear*

STANDARD SIZES OF WIRES ARE AVAILABLE FROM STOCK

1.728"/DP for external spurs
1.44"/DP for internal spurs and 30° splines
1.92"/DP for enlarged pinions and 30° splines
1.68"/DP tentative alternate series

CATALOG AND HANDBOOK NO. 34

This 208 page volume represents 2 years of research sponsored by the Van Keuren Co.
It presents for the first time in history a simple and exact method of measuring screws and worms with wires.
It tells how to measure gears, splines and involute serrations. It is an accepted reference book for measuring problems and methods.
Copies free upon request.

THE *Van Keuren* CO., 174 Waltham St., Watertown, Mass.

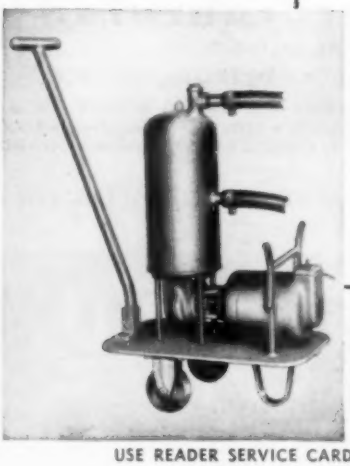
31ST YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Measuring Wires • Carboloy Plug Gages.

USE READER SERVICE CARD; INDICATE A-6-132-2

RUTHMAN *Rumaco* SUMP-CLEANING PUMP

THIS handy, fully portable unit is ideal for the speedy removing of coolants from machine-tool reservoirs and sumps. The simplified arrangement of a centrifugal pump and integral reprimingtanks offers you economical, trouble - free performance. The unit is mounted on a fabricated-steel truck with rubber-tired casters with 3/4 HP electric motor. Capacity 45 GPM at 8' head. Write for bulletin #48J and Gusher Coolant Pump Catalog *today*.



THE RUTHMAN MACHINERY CO.
1810 Reading Road
Cincinnati 2, Ohio

USE READER SERVICE CARD; INDICATE A-6-132-4

DON'T LET *Time and Money* DRIBBLE away

through poorly DRILLED and TAPPED HOLES

Use SJ **SCULLY-JONES**

DRILL and TAP CHUCKS

to speed production and cut costs

Save costly set-up and down-time: *No moving parts to get out of order. Simple one-piece design. Easy to insert or eject from any Morse Taper hole. Broached square provides positive drive... eliminates slipping and tool damage. Collet action automatically centers tool.*

Reduce tool replacement: *Carefully hardened to resist nicking and burring, which often cause misalignment and tool damage. Built to withstand modern production methods and outlast many drills or taps.*

Drill and tap accurately: *Bore and shank machined concentrically to assure true-running tools and reduce rejects.*

Work on close centers: *Small body diameter makes these chucks ideal for close center and multiple spindle work.*

Reduce drilling costs: *Get additional savings, by using new extra flute length drills now made by many drill manufacturers. Only 4 Style "B" Drill Chucks required to drive the 41 new drill sizes, ½" and over.*

"STYLE A"
SCULLY-JONES TAP CHUCKS

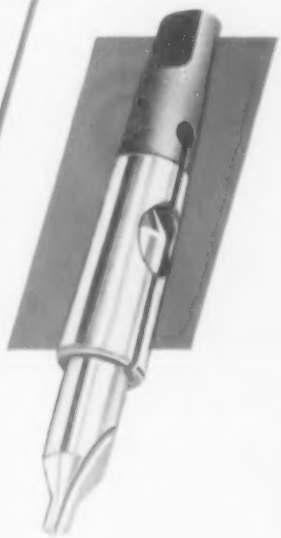
Save costly "Set-Up" and "Down-Time". Drive tap by the square — center by the shank — hold with a collet action. Tap holes accurately; ground concentric to eliminate bell-mouth and over-size tapped holes.

"STYLE B"
SCULLY-JONES DRILL CHUCKS

For driving straight shank drills. Make possible 25% or more saving. Small diameter makes them ideal for close center or multiple spindle work. Easy to use. Positive drive; no slipping. Accurate drilling.

"STYLE B"
SCULLY-JONES TAP CHUCKS

Similar in design to Style "B" Drill Chucks. Permit close center distances because they are smaller in diameter than the spindle. No moving parts to get out of order; require no adjustments.



"STYLE B"— SCULLY-JONES CENTER DRILL DRIVERS

For driving combined center drills and countersinks—regular and bell styles. Simple one-piece tools; small diameter makes them suitable for work on close centers.

Send for New Bulletin No. I-50
on Scully-Jones Drill and Tap Chucks. Supersedes all previously publised listings and prices.

Scully-Jones AND COMPANY

1915 S. ROCKWELL ST., CHICAGO 8, ILLINOIS R-5167

YOU GET LOW COST, FAST, ACCURATE PRODUCTION WITH OUR STANDARD AND SPECIAL TOOLS

TURN BLUEPRINTS INTO ACTION

QUICKLY,

ECONOMICALLY,

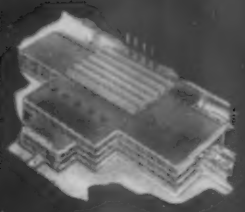
WITH

BETTER PRODUCTION METHODS

How to improve your production methods—or how you may lick any production, engineering, or designing problem—is outlined in informative bulletins covering the subjects listed on the next page. They will be mailed on request without obligation to responsible business firms.

Request, on your letterhead, bulletin that interests you.

IONEER ENGINEERING AND MANUFACTURING COMPAN



lants Like Yours Are Using This Staff

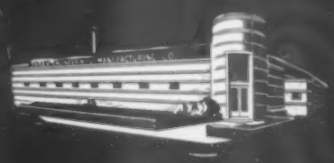
INTERNAL ORGANIZATION
Establishment of the framework to execute management's policies; simplification of routines to handle orders, records and reports with minimum paperwork; allocation of responsibility and authority to prevent friction caused by overlapping controls.

PRODUCT DESIGN AND DEVELOPMENT
Realistic comparison drawn between cost of developing and manufacturing a new product and probable realization of returns; existing products redesigned for increased sales appeal by comprehensive analysis of appearance, function and performance.

PRODUCTION METHODS
Study of production sequence to eliminate, combine, change order of, or simplify operations; analysis of basic process and recommendations for machines, tools and accessories to competently balance out production lines.

QUALITY CONTROL
Compilation of accumulative tolerance charts to assure any product meeting established manufacturing limits; correct location of inspection points and setting of standards and procedures to keep scrap at absolute minimum.

TOOL AND SPECIAL MACHINE DESIGN
Design of tools, dies, jigs, fixtures and gages to complement and implement any machine; modern production problems conquered by specially designed machine tools incorporating hydraulic, pneumatic or electronic controls.



TIME AND MOTION STUDY
Determination of quickest and best work sequence with suggested improvements in workplace, methods and tools; study of operators' physical movements to correct bad operating practices, lessen fatigue and increase efficiency.

MATERIAL HANDLING
Unbiased recommendation and selection of equipment best suited to job—whether it be hand trucks, truck tractors, power lift trucks, stackers, gravity-roll, power or chain conveyors, cranes or hoists.

PLANT LAYOUT
Flexible plant arrangements for steady progression of production obtained through preparation of process flow charts which clearly reveal bottlenecks; charts may be projected into template or scale model layouts for even more detailed study.

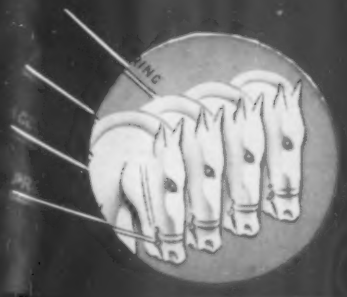
PRODUCTION CONTROL
Channeling work through a plant so sales schedules are kept in definite balance with production capacity; machine loads are accurately charted to give assurance that delivery dates can be met.

COST CONTROL
Determination of pertinent cost information, currently accurate for use as a means of establishing prices and operating efficiency, to guide and guard present conditions and intelligently chart an organization's future course.

ONEER ENGINEERING
& MANUFACTURING CO.
Incorporated

NGINEERS, DESIGNERS, CONSULTANTS
ND PRODUCTION SPECIALISTS

19669 John R. Street
Detroit 3, Michigan



Index of The Tool Engineer Advertisers

JUNE, 1950

The Index to Advertisers is published as a service to readers. Although every precaution is taken to assure correct listing, no allowance will be made for error or omission.

A

Acme Industrial Co. 110
Acme School of Die Design Engineering 82
Acme Tool Co. 126
Allegheny Ludlum Steel Corp. 10
Allied School of Mechanical Trades 78
American Broach and Machine Co.
Division of Sundstrand Machine Tool Co. 4
American Society of Tool Engineers 102–125
Ames Co., B. C. 79
Anderson, F. E., Oil Co. 117
Armstrong Brothers Tool Co. 70

B

Baird Machine Co. 125
Barnes, W. O., Co., The 91
Bath, John Co., Inc. 9
Bausch & Lomb Optical Co. 127
Bay State Abrasive Products Co. 119
Behr-Manning Corp. 5
Bellows Co., The 16
Besly, Charles H., and Co. 129
Bethlehem Steel Co. 109
Brown & Sharpe Mfg. Co. 122–123
Bullard Co., The 100

C

Carborundum Co., The 101
Carpenter Steel Co., The 118
Chicago Rivet & Machine Co. 110
Chicago Tool & Engineering Co. 120
Cleveland Twist Drill Co., The ..... Inside Back Cover
Columbia Tool Steel Co. 116
Continental Tools Works Division,
Ex-Cell-O Corporation 121
Crucible Steel Company of America 112
Cushman Chuck Co., The 97

D

Danly Machine Specialties, Inc. 83-113
Detroit Reamer & Tool Co. 126
Dumore Co., The 71
Dykem Co., The 110

E

Eastman Kodak Co.
Industrial Optical Sales Division 120
Engis Equipment Co. 80
Ex-Cell-O Corporation
Continental Tool Works Division 121

F

Federal Products Corp. 114
Fellows Gear Shaper Co. 110
Frick-Gallagher Mfg. Co., The 81
Fuller Tool Co. 110

G

Gairing Tool Co., The 72
Gorham Tool Co. 116

H

Hammond Machinery Builders, Inc. 115
Hannifin Corp. 84
Hardinge Brothers, Inc. 3
Hartford Special Machinery Co., The 108
Hassall, John, Inc. 88
Heald Machine Co., The 15
Herman Stone Co., The 116

I

Illinois Tool Works 14
Industrial Optical Sales Division
Eastman Kodak Co. 120

K

Keller Tool Co. 130
Kennametal, Inc. 85

L

Landis Machine Co. 2
Lassy Tool Co. 126
Leblond, R. K., Machine Tool Co., The 111
Littell, F. J., Machine Co. 115

M

Majestic Tool Co. 104
Manhattan Rubber Division,
Raybestos-Manhattan, Inc. 76
Millers Falls Co. 138
Miller Motor Co. 86
Milne, A. & Co. 75
Modernair Corp. 115
Motch & Merryweather Co., The 102

N

National Broach & Machine Co. 96
National Tool Co. 77
National Twist Drill & Tool Co. 6-7
Niagara Machine & Tool Works 12-13
Norton Company 8–137

O

Oilgear Co., The 107
O'Neil-Irwin Mfg. Co. 88

P

Pioneer Engineering & Mfg. Co. 134–135
Pioneer Pump & Mfg. Co. 120
Pope Machinery Corp. 99
Potter & Johnston Co.
Subsidiary of Pratt & Whitney Division,
Niles-Bement-Pond Co. 95
Pratt & Whitney Division,
Niles-Bement-Pond Co. ..... Inside Front Cover

R

Raybestos-Manhattan, Inc.
Manhattan Rubber Division 76
Ruthman Machinery Co., The 132

S

Scherr, George, Co., Inc. 78
Schrader's, A. Sons 93
Scully-Jones & Co. 133
Seneca Falls Machine Co. 124
Service Machine Co. 116
Severance Tool Industries, Inc. 120
Sheffield Corp., The ..... Back Cover
Simmons, W. T. 80
Simonds Saw & Steel Co. 105
Snow Mfg. Co. 83
Sperry Corp., The, Vickers, Inc., Division 131
Standard Pressed Steel Co. 128
Standard Tool Co. 103
Starrett, L. S., Co., The 11
Stokerunit Corp. 106
Stuart, D. A., Oil Co., Ltd. 90
Sturdy Broaching Service 132
Sundstrand Machine Tool Co.,
American Broach & Machine Company Division 4
Swartz Tool Products Co., Inc. 102
Super Tool Co. 87

T

Tempil Corp. 92

V

Van Keuren Co., The 132
Vickers, Inc.,
Division of The Sperry Corp. 131
Vulcan Tool Co. 89

W

Wales-Strippit Corp. 98
Western Tool & Mfg. Co. 132
Wilson Carbon Co., Inc. 114
Winter Brothers Co.,
Division of the National Twist Drill & Tool Co. 6-7

Z

Ziegler, W. M. Tool Co. 114

Lower Your Carbide Grinding Costs

with

CRYSTOLON WHEELS *in the New K-Bond*

A faster and freer cutting action combined with greatly increased uniformity in grinding action — this is what you get with the *new Norton K-Bond*, a new vitrified bond for CRYSTOLON grinding wheels both green and gray. The high rate of stock removal and the cool cutting action of the new K-Bond speed up the grinding operation and help eliminate spoiled tools — thus they reduce the over-all grinding costs.

Also, the Norton K-Bond has brought about a new standard of uniformity to vitrified bonded silicon carbide wheels. These products can now be controlled to such a degree of accuracy as to make is possible to produce wheels of half grade increments of hardness. Thus Norton wheel specifications can be "pin-pointed" to suit the individual requirements of your carbide grinding jobs.

In plant after plant, the new K-Bond CRYSTOLON wheels are showing remarkable results. *You will want to try them, too.*

NORTON
ABRASIVES

NORTON COMPANY, WORCESTER 6, MASS. · Warehouses in Five Cities · Distributors in All Principal Cities

NEW

POSITIVE CLUTCH

"Dyno-Mite®" Screw Drivers

give you . . .

MILLERS FALLS TOOLS

SINCE 1868

NEW FLEXIBILITY!

Wherever extreme sensitivity and uniform torque adjustments are needed, Millers Falls famous "Adjustomatic"® Clutch screw drivers are making production history. Now, for the vast number of applications demanding variable torque, Millers Falls has developed a new, *positive clutch* with kick out controlled by driving pressure. Thus any desired torque can be applied — the harder you push, the harder it drives.

NEW ECONOMY!

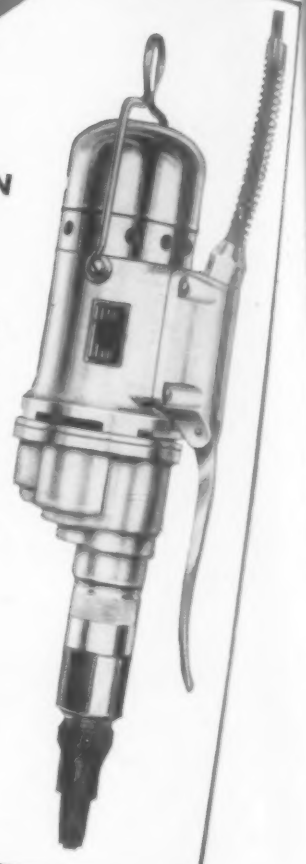
These new *Positive Clutch* "Dyno-Mite" Screw Drivers give you the same smooth, dependable operation and high output that have made Millers Falls "Adjustomatic" Clutch models such favorites — but simplicity of design makes possible substantially lower prices. On any application where variable torque is desired, they offer the greatest values of any power screw drivers made.

NEW SPEED!

Because workers can instantly apply the torque needed for each individual driving operation, production speed is increased materially. Operators can work faster, too, because danger of stripped slots is minimized by the fact that driving action automatically stops unless sufficient pressure is applied to hold bit firmly in place.

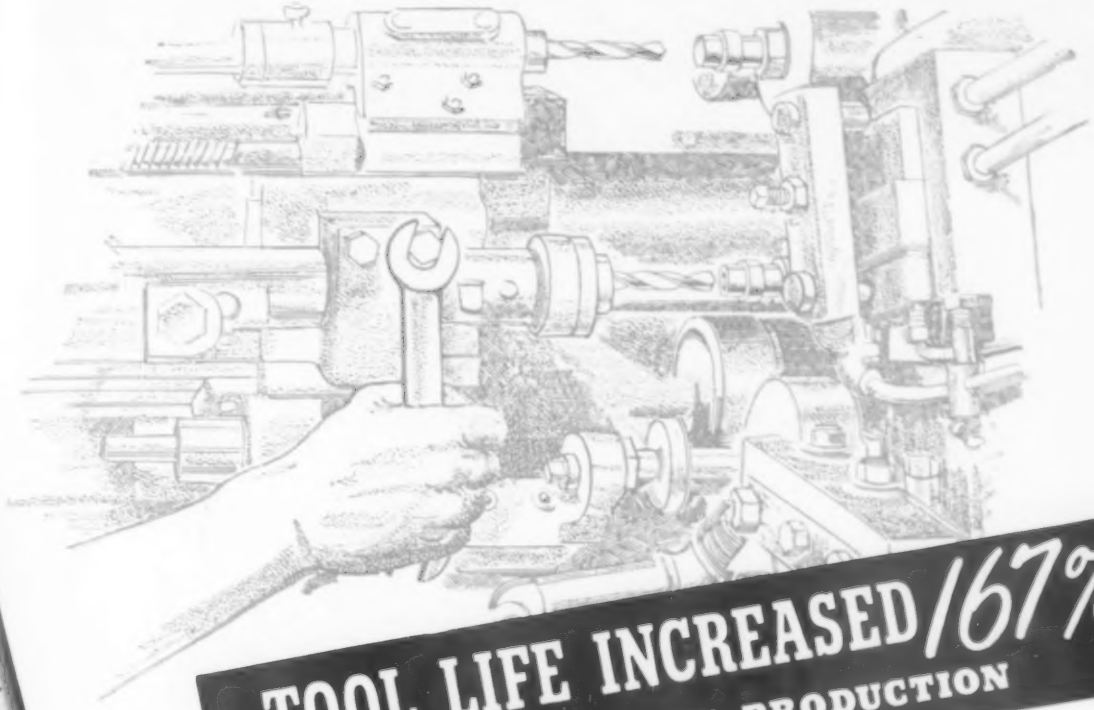
PRODUCTION STAR ON DELICATE ASSEMBLY

For assemblies usually considered too delicate for power screw driving, Millers Falls super-sensitive "Adjustomatic" Clutch really shines. Torque can be adjusted quickly and accurately. Operation is velvet-smooth and vibrationless. Available on the compact, light, highly efficient No. 50 shown at right as well as the power-packed "Dyno-Mite" line.



Millers Falls new, *Positive Clutch* "Dyno-Mite" Screw Drivers are available in a wide range of capacities and speeds. Write today for name of your nearest distributor or survey of your particular requirements by our highly trained staff of expert sales engineers.

MILLERS FALLS COMPANY • GREENFIELD, MASSACHUSETTS



TOOL LIFE INCREASED 167%
. . . WITH 8% MORE PRODUCTION

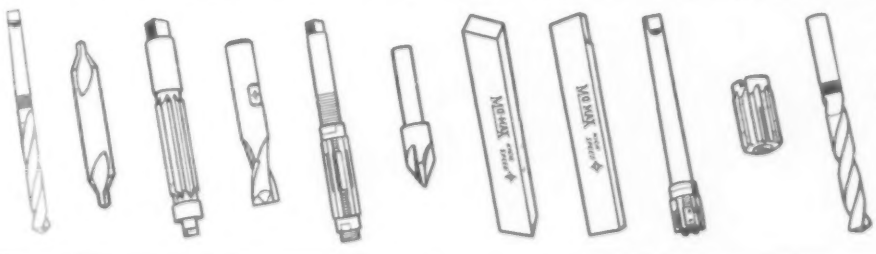
by using Cleveland drills at correct feed and speed

For best results in automatic screw machines, you naturally choose the finest, most durable tools—such as the CLE-FORGE High Speed Drill shown here. But this alone is not enough. ◈ A few months ago one of our Service Representatives was making a survey in a customer's plant. On a six-spindle automatic he reduced the speed from 1740 to 1566 r.p.m. and increased the feed from .0035 to .0042 f.p.r. Result: Drill life jumped from 1½ hours *to 4 hours.* ◈ A *Cleveland* Service Representative may be able to effect similar savings for *you.* Contact our nearest Stockroom, or . . .

Telephone Your Industrial Supply Distributor

THE CLEVELAND TWIST DRILL CO.
1242 East 49th Street • Cleveland 14, Ohio
***Stockrooms:* New York 7 • Detroit 2 • Chicago 6 • Dallas 1 • San Francisco 5 • Los Angeles 58**
E. P. Barrus, Ltd., London W. 3, England

ASK YOUR INDUSTRIAL SUPPLY DISTRIBUTOR FOR THESE AND OTHER *Cleveland* TOOLS



FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-139

$79,754 NET PROFIT IN 38 MONTHS

with this SHEFFIELD AUTOMATIC GAGE

From Nov. 1, 1945 through 1946-7-8 more than 68,400,000 automotive shock absorber pistons were checked and segregated according to undersize, oversize and five tolerance ranges of .0005 each.

Original cost of $14,400 was amortized in 5½ months.

Net profit of $79,754 had been realized in 38 months when a major design change in the shock absorber caused the machine to be shifted from full time to periodic inspection of replacement parts—*but it is still in operation* and producing more profit.

This is but one of many case histories of amazingly high and quick returns on investments in Sheffield Multiple and Automatic Inspection Equipment.

At your service are competent engineers for consultation or survey, *without obligation.*

Address Consultation Service 5537

Other Sheffield Automatic and Multiple Gages

MASTER CRAFTSMEN SHEFFIELD HEADQUARTERS

the *Sheffield* corporation

Dayton 1, Ohio, U.S.A.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-6-140